

Månsson, Jonas; Quoreshi, Shahid

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Evaluating regional cuts in the payroll tax from a firm perspective

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Evaluating regional cuts in the payroll tax from a firm perspective

By

Jonas Månsson

Department of Economics and Statistics

Linnaeus University, Växjö, Sweden

and

A.M.M. Shahiduzzaman Quoreshi

Department of regional studies

The Swedish Agency for Growth Policy Analysis and Evaluation

Östersund, Sweden

Abstract

Cuts in payroll taxes as a regional support measure are used throughout Europe. Most evaluations focus on the impact on employment and not much research indicate that this type of support has any effect on employment. In this paper on the impacts of the Swedish support we address this type of support from a firm perspective: what impacts can be expected for/in the firm? From the theory and business logic we claim that support given to a firm can be used for whatever purpose the firm finds most suitable. We therefore extend the analysis to cover the effects on turnover, employment, wages, investments, long run debts, and profits. The second shortcoming is the time horizon. Most evaluations evaluate the impacts of payroll tax cuts with a few years after the support was launched. In our evaluation, the support was launched in 2001 and we follow firms until 2009 so that we can monitor the impact development over an eight-year period. Finally, we propose a method of evaluating regional policy. Our results indicates that a between 20-55 percent in the variation in our outcome variables can be explained by the composition and characteristics of municipal population. Further, the result from the evaluation follows a clear business logic. In the short run, both profits and turnover increased. These increased profits are later used to increase wages (including the owners'). Seven years into the observation period, we find indication of impacts on investments. As in previous evaluations we do not find any significant impacts on employment. However, from a policy perspective we conclude that the support has some short-term impacts that are reduced with time and the long-term effects are questionable.

Keywords: Payroll tax cuts, impacts, firm perspectives, regional heterogeneity, multilevel analysis

JEL: R28

1. Introduction

The reduction in payroll taxes has been used as a subsidy to compensate the firms throughout Europe that are located in remote areas or have some geographical disadvantages. Most of the studies evaluating the effects of the support focus on employment issues. In this paper we argue that even though the subsidies are intended to raise employment, the effects of the subsidies may appear in other outcomes since the firms are free to use the subsidies as they like. Payroll tax subsidies tied to individuals, which are usually of a labour market policy nature, can be directly related to employment. Previous studies have shown positive effects on employment in the sense that the unemployed found work. The subsidies that are aimed at firms, which are usually of a regional policy nature, can have several possible effects since the firms are free to dispose of the additional surplus that stems from the subsidy as they wish. Earlier studies give little support of payroll tax subsidies directed at firms resulting in effects on employment. Bennmarker, et al. (2009) investigated the effects of payroll tax subsidies on employment, wages and firm entry and exits. They found no impacts on employment and a small impact on number of net new firms, number of entries minus number of exit. The effects of the subsidy on the number of net new firms disappear when some other variables are taken into consideration in the regression model. Like other studies, this study has at shortcomings. One shortcoming concerns expected outcomes. From the theory and business logic we claim that support given to a firm can be used however the firm finds most suitable. Therefore, evaluating the employment impacts and number of net new firms is a rather narrow focus. For this reason, we include a significant number of new outcomes which are turnover, employment, wages, investments, long-run debts and profits, to capture the effects of the subsidy from a firm perspective. Another shortcoming is the time horizon. For example, Bennmarker, et al. (2009) evaluates the impacts of payroll tax cuts three years after the support were launched. In our evaluation the support is launched in 2001 and we follow firms until 2009 so that we can monitor the effects over an eight-year period.

Finally, we propose a method to be used when evaluation of regional policy. Since firms are nested within municipalities or industries, a traditional econometric approach using dummy variables to capture regional and industry heterogeneity can produce both biased impact estimates and biased standard errors. To minimize the possibility of error and bias we apply a multilevel model which enables us not only to control for regional heterogeneity but also to measure the importance of these contextual factors. Our results indicate that between 20-55

percent of variation in our outcome variables can be explained by the characteristics of a municipality. Furthermore, the results from the evaluation follow clear business logic: In the short run, profits and turnover both increase. The increased profits are later used to increase wages (including owners'). Seven years into the observation period, we see the indication on effects on investments but not on employment. Finally, we see that the profits increase in the beginning of the evaluation period, but diminish as time passes. From a policy perspective we conclude that the support has some short-term effects that are reduced with time and that the long-term impacts are uncertain.

The paper is organised as follows. A short description of the support is given in chapter 2. Chapter 3 summarises the relevant literature. A theoretical framework is developed and discussed in chapter 4. A description of the evaluation design and econometric specification are given in chapter 5. The sources of data and a summary statistics are to be found in chapter 6. Empirical results are presented in chapter 7. Finally, chapter 8 concludes the paper and some concluding remarks are stated.

2. Institutional settings

Besides paying wages, firms pay a payroll tax for its employees.¹ In Sweden, the size of the payroll tax has for a long time been between 30 and 33 per cent on top of the gross wage. In 2012 the general payroll tax is 31.42 per cent. The cut in the payroll tax evaluated in this study was introduced in 2002, when the tax rate was 32.82 per cent. The measure itself is a reduction in the payroll tax by 10 per cent of the total amount paid to the state. Only the firms in a certain geographical area are eligible for this reduction. In the map presented in figure 1, firms located in support area A (Stödområde A) are eligible. In the map support area B (Stödområde B) is also indicated. Firms in support area B are also entitled to regional subsidies but not to reduced payroll taxes. Besides the geographical limitations that are some other criteria that have to be met.

i) The support is directed to all firms within the regional area, except firms in agriculture, forestry, fishing and transport.

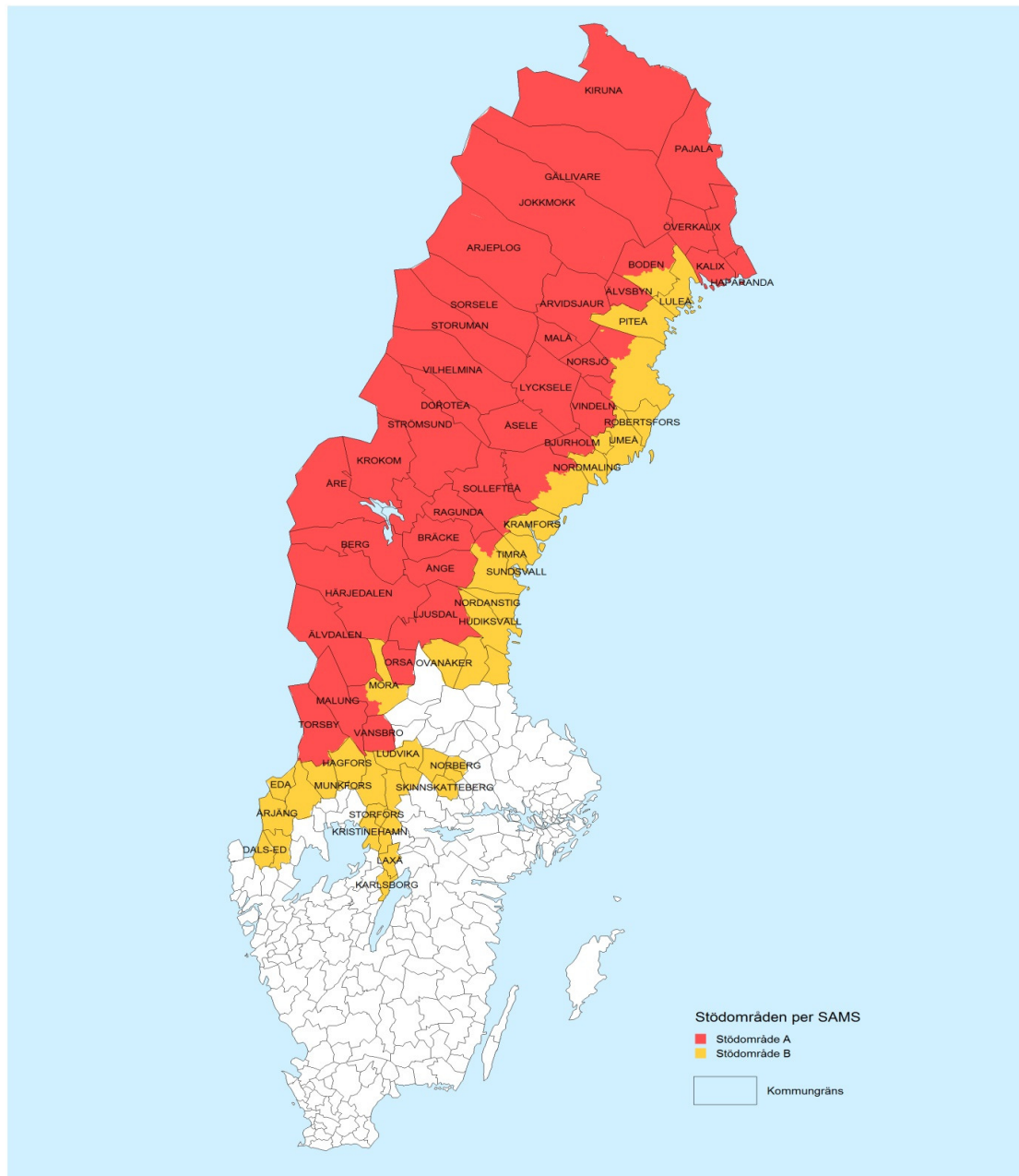
ii) The support is limited to a wage ceiling of 852 000 SEK. This corresponds approximately to three full-time equivalent workers in the manufacturing sector. The maximum amount of reduction thus corresponds to 85 000 SEK.

¹ The different components in the payroll tax are described in von Grief (2008).

iii) To control eligibility, the Tax Office made a pre-printed tax declaration and only firms that had the tick-box indicating eligibility were eligible for the support.

The reduction in the payroll tax cuts is not limited in time; however there has been a continuous discussion about whether to discontinue the support. This might have influenced firm behaviour. The cut in payroll taxes equals a reduction in the government's revenues of around 500 million SEK annually.

Figure 1. Support area A and support area B



3. Previous studies

All of the studies that we have surveyed were initiated after the reform was launched, and in most cases, after the reform had ceased. Therefore we do not find any evaluation with true experimental design. In all evaluations, regional differences are used to construct the counterfactual situation. Further, in all of the reviewed studies the main research question has focused on employment and the effects on wages.

Bohm and Lind (1993) investigate a payroll tax cuts aimed at counties in the north of Sweden. To construct the counterfactual they use counties in close geographical proximity. Further, to select firms among the gross population the authors use a twin approach: the untreated firms are matched to the treated firms in some important characteristics (e.g. age, size and industry). The authors do not find any significant impact on employment, but they do find positive impacts on profits. Bennmarker et.al (2009)² studies the same support as done in our study with attention to employment and wage effects and firm dynamics. To construct the counterfactual the authors uses untreated firms in neighbouring SAMS–areas to the treated firms that were not eligible for the support. The authors then apply a difference in difference approach. The result of the evaluation again points to the fact that cuts in payroll taxes do not give any employment effects, however there are some indication of wage effects, i.e. subsidized firms tends to have higher wage costs, even though the payroll tax has been cut. After controlling for firm dynamics, the wage effect becomes insignificant.

Payroll tax cuts have also been used in other Nordic countries. Korkeamäki (2009) evaluated the reduction in payroll taxes in Finland in 1999-2000 when firms in 20 municipalities could apply for the support. The outcome is measured in 2004. Thus, the Finnish support depended not only on geographical area which created an opportunity to use this selection in the construction of the counterfactual. Korkeamäki (2009) uses a propensity score approach where the probability to be selected as a supported firm is estimated and predicted for all firms. Firms are then matched based on the predicted probability of being selected for support. The result indicated no employment effects, however, some impact on wages.

The same type of measure has also been introduced in Norway. Johansen and Klette (1998) study the cuts in payroll taxes in Norway for 1983-1993. They use the fact that the reduction in tax cuts is different among firms. The question is thus more of a marginal analysis, which is the impact of one additional percentage point cut in payroll taxes. The conclusion from the study is that there are no employment effects but strong wage effects, i.e. low payroll taxes are strongly correlated with high wages. One of few studies that, at least to some degree, hint at a positive impact on employment is presented in Østbye (1998) who use simulation techniques to forecast the impacts. However, the study is problematic in our context. Firstly, it

² Bennmarker et.al (2009) is based on a commission work from the Swedish National Audit Office (Hollen and Johansson, 2008). A more extensive version of the paper is also published as a working paper at the Institute for Labour market Policy Evaluation (Bennmarker et.al, 2008). Both these are however in Swedish.

is a simulation study with no observed counterfactual. Second, it is limited to the Norwegian fishing industry.

Anderson and Mayer (1997) study tax cuts in eight states in the US, using firm data. A problem with this study is that no data exist prior to the tax cut. The comparisons are thus only made on the fact that firms are located in different states. In the study, large wage impacts and no employment impacts are identified. A slightly different approach is presented in Murphy (2007) who studied tax cuts in USA for 1992–2002. In this study data are aggregated to state level and are estimating the state level impact of payroll tax cuts on aggregate wage.³ The findings are that the impact of payroll tax cuts on wages varies among groups. The impact for, what is defined as, high mobile groups (male, 24 - 54 years of age) are small while the impact on wages for low mobile groups (married female, 25–54 and younger workers) are larger. Further the author reports a two-year time lag between intervention and result. Gruber (1997) uses the variation in the level of tax cuts among regions to address the evaluation question in Chile. However, as in Johansen and Klette (1998) there are some variation between regions in the payroll tax cuts and the research is more of a marginal approach. The conclusion in Gruber (1998) is that the cuts in payroll taxes were transferred to workers in terms of higher wages and that no employment effects could be identified.

To summarise, previous research on the impact of cuts in the payroll tax focus largely on employment and wage effects. The overall findings are that such impacts do not occur.

4. Theoretical framework

One general distinction has to be made concerning the theoretical framework to be used for this type of support. A cut in the payroll tax is used within different political areas, e.g. as a wage subsidy within labour market policy or as a business support within growth policy. The differences between these two political areas pertain to what is expected and the recipient of the support. Within labour market policy the support is directed to the unemployed individual while it is in the growth policy context is directed towards firms. The impact of payroll tax cuts within labour market policy is well documented and the general finding is that this type of wage subsidy has positive impacts in the sense that the unemployed find jobs (see e.g. Forslund et.al, 2005; Martin and Grubb, 2001). However, payroll tax cuts as a growth-

³ Both Bennis et.al (2009) and Murphy (2007) consider the endogeneity problem and estimate the impacts using an instrumental variable (IV) approach. We are, however, not convinced that endogeneity is a problem. Further, if an IV method were to be applied there has to exist a set of good instruments something we having problem to identify. The consequences of weak instruments are discussed in e.g. Murray (2006).

oriented support is less studied than labour market-oriented policy measures.⁴ Our theoretical framework thus takes its starting point from a firm perspective. The question is: How can firms' use the additional funds that come from the cut in payroll taxes?

The starting point for our discussion is a standard profit function where it is assumed that the goal for the firm is to maximize profits (π). The profit-maximizing problem is presented in equation [1]. Let p be the price that is determined by the inverse demand ($p(y)$) which is a function of production (y). Further, c is the total cost function that are determined by the price of labour (w), price of capital (r) and total output. Given these notations the profit function is:

$$[1] \quad \pi(w, r, y) = y \cdot p(y) - c(w, r, y)$$

The cut in payroll taxes implies that for firms that are eligible for the support, the price for labour diminishes, while the price is unchanged for the non-eligible firm.⁵ It can therefore be assumed that in the short run, profits for supported firms will increase more than for other firms. The additional profits emerge from the reduced payroll tax create a number of possibilities for the firms.

One possibility is that the firm can use the profits to lower its prices and thereby increase its market share. Increased market shares will to some extent be captured by an increase in turnover. Increased production is, through the production function, linked to increased use in factors of production. Thus, in absence of inefficiency prior to the intervention, we can expect increased production to result in increased use of labour or capital or a mix of labour and capital. The exact amounts are determined by the technology. Further, most of the firms finance some part of their capital stocks through loans. The interest rate for those loans is included in the price of capital (r). If capital is relatively expensive, another option for the firm is to use the lowered payroll taxes to reduce the long-term price of capital by paying off loans and thereby reducing the long term debts. Finally, the decrease in payroll taxes can be used to increase the wages for the employee or to compensate the owners.

⁴ There are, of course, supports that have a targeted and narrow goal formulation, e.g. employment support. In contrast to the cut in payroll taxes this support is connected to the individual rather than to the firm (see e.g. Falkenhall and Melkersson, 2003)

⁵ The theoretical foundations concerning employment and wage effects of a payroll tax cut is presented in e.g. Agell and Sörensen (2006), Holmlund (1983) or Holmlund and Kolm (1996). One conclusion is that the size of the expected impacts depends on how sensitive labour demand is for adjustments in wage costs.

On a less competitive market that allows for long-term profits there are even more options. One is that the profit level is ‘permanently’ increased (see e.g. Bohm and Lind, 1993). There are at least three measures that can be used to capture a rise in long-term profits. Firstly, and most obvious is that the profits according to the financial reports has increased. However, increased profits can also be used to obtain a higher competitive power on the labour market by raising wages, introducing fringe benefits. Finally, reduction in payroll taxes can make the owners of the firms wealthier.

To summarise: The theoretical discussion and previous research raises some questions. Our main point is that the reduction in payroll tax cuts cannot be expected to have one single impact: increase in employment. The firm has free disposability of its assets and the evaluation of this type of measures must include several of these outcomes in order to identify impacts. A first question is thus: “Where do the cuts in payroll taxes go?” According to previous research, one part of the payroll tax cuts ends up higher wages. However, the theoretical model gave more possible destinations that are not, according to our survey, included in other studies. This calls on the need to expand the range of possible outcomes in the evaluation. The outcomes included in this evaluation are summarised in table 1:

Table 1: Outcomes and outcome measures

Outcome	Outcome measure
Increase employment	Number of employed
Increased capital	Investments
Increased production	Increase turnover
Increase profits	Accounting profits
	Wage costs including benefits
	Long run debts

Second, research has found that timing for the evaluation is crucial. As noted in Murphy (2007) it takes at least two years for the impacts to appear. This calls for a longer follow-up period. A third aspect that merits consideration is the construction of the support. In most countries the support is introduced in regions that for some reason or not are doing less well. This regional heterogeneity can be dealt with in several ways. In the evaluations presented

above, regional heterogeneity is captured by the use of a number of indicator (dummy) variables representing region. Finally, can we model this regional heterogeneity so that the results make it possible for us to understand how important regional variation is for the explanation of impacts, or lack thereof?

5. Evaluation design and econometric specification

The evaluation design used in this study is a difference in difference approach (*DID*) (see e.g. Ashenfelter and Card, 1985). The treatment in our model is firms eligible for support and belonging to support area A. The untreated groups consist of firms located in SAMS–areas with close geographical proximity to the treated ones but belonging to support area B. The pre–treatment period in our study is year 2001 and we estimate separate equations for each of the years following the introduction of the support, 2002 – 2008. Table 2 gives a description of the approach.

Table 2. Illustration of difference–in–difference approach for evaluation the payroll tax cuts (*DID*)

	Before	After
Support area A (Treated)	C	D
Support area B (Untreated)	E	F

The *DID* estimate is defined as $(D-C) - (F-E)$. As mentioned above the purpose of the support is to reduce regional imbalance and we can expect regional heterogeneity. The traditional econometric approach to deal with regional heterogeneity is to use indicator, or dummy, variables. The problem with this approach is, as pointed out by e.g. de Leeuw and Meijer (2008), that no new information is supplied while the number of estimated parameters becomes large. This can result in biased estimates and in biased standard errors. An alternative to indicator variables is to use a multilevel approach and utilise the fact that all firms are nested in different municipalities.⁶ The multilevel approach makes it possible to address both questions simultaneously and also to investigate how much of the variation in the firm outcomes can be related to regional characteristics.

⁶ See e.g. Gadd et.al (2008) for another application concerning regional support.

Using the notation of multilevel analysis the firm variation within a municipality is estimated on level one, and the variation between municipalities is estimated on level two.⁷ To illustrate the approach let $y_{i,j}$ be an outcome, e.g. employment, in firm i that is located in region j ($j=1,2,...,N$). For each of these companies there is a vector of firm characteristics that is used as controls ($x_{i,j}$). Combining these with the approach described above give us a firm level equation within each municipality that can be expressed as:

$$[2] \quad y_{i,j} = \alpha_j + \beta_j x_{i,j} + \omega_j^1 \text{After}_{i,j} + \omega_j^2 \text{Treated}_{i,j} + \gamma_j \text{DID}_{i,j} + \varepsilon_{i,j}, \quad j = 1, 2, \dots, N$$

$\alpha_j, \beta_j, \omega_j^1, \omega_j^2$ and γ_j are parameters to be estimated for each region and $\varepsilon_{i,j}$ is the error term. $\alpha_j, \beta_j, \omega_j^1, \omega_j^2$ and γ_j will differ by region. Multilevel analysis means that we, with use of data on regional level, explain the variation in the regional specific estimated parameters by specifying a function for the observed variation in either the intercepts and/or the slope parameters. These are then regressed against regional characteristics. In equation [3] the treatment random intercept is described:

$$[3] \quad \alpha_j = \tau + \theta z_j + \varepsilon_j$$

In equation 3 α_j is the intercepts for each region and z_j is a vector of regional characteristics – e.g. population, population density, share of high educated inhabitants, growth in the region 1999-2001. If equations [2] and [3] are estimated separately, we get a special case of multilevel analysis that in the literature is denoted Random coefficient model or ‘Slope-as-Outcome’. In multilevel analysis, equations [2] and [3] are estimated simultaneously which mean that the variation between firms in the same region (within) and the variation among firms in different regions (between) can be analysed.⁸ A measure of the extent to which regional variation influences the firm outcome, the inter class correlation (*ICC*), can be computed as follows:

$$[4] \quad ICC = \frac{\sigma_j^2}{\sigma_j^2 + \sigma_{i,j}^2}, \text{ where } \sigma_j^2 = \text{var}(\varepsilon_j) \text{ and } \sigma_{i,j}^2 = \text{var}(\varepsilon_{i,j})$$

⁷ Multilevel analysis was developed within the disciplines of education to be used in evaluating reforms in schools. In that context data is used on students (student effects) within different schools (school effects) A good description of the development of multi level analysis can be found in e.g. de Leeuw and Meijer (2008).

⁸ See e.g. de Leeuw and Meijer (2008) for a discussion on the differences between the different models.

The interpretation of *ICC* is how much of the variation in the outcome can be explained by context factors, such as described above. A value close to 0 indicates no contextual influence and a value close to 1 indicates that the major part of the variation in outcome is explained in terms of contextual factors.⁹

6. Data

Data for the evaluation is comprised from different registers within Statistics Sweden (SCB). The distribution of the support is based on geographical location according to the *Small Areas for Market Statistics* (SAMS) code and we use that information to construct the treatment and the untreated groups. The population of firms in the evaluation consists of firms in the area eligible for support; this is defined as the treatment group. The untreated group of firms comprises of firms that are not eligible for the support but located in the neighbouring SAMS-areas. To be included firms should have at least one employee and exist for the whole period. A few firms have operations in both types of regions and have been excluded. Data for 2001 serve as the pre-treatment period and we use yearly data for 2002-2008 as post-treatment periods

The outcomes that are studied are impacts on employment, wages and other wage benefits, turnover, gross investments, long-term debts and profits. Information about all outcomes except wages and other wage benefits are collected from the SCB survey, “The economy of firms”. This information is collected either quarterly or is retrieved from the firms' yearly accounts. We have used yearly information. Wages and other wage benefits are collected from the database “Wage sums, payroll taxes and preliminary wage taxes (LAPS)”. Descriptive statistics of the data used are presented in table 3.

⁹ See e.g. Raudenbush and Bryk (2002).

Table 3: Descriptive statistics on outcomes

<i>Variables</i>	<i>Year</i>	Support area A Treated			Support area B Untreated		
		N	Mean	Std.Dev	N	Mean	Std.Dev
<i>Number of employed</i>	2001	4014	7.95	38.49	8103	20.72	174.88
	2002-2009	32096	9.01	39.45	64819	21.71	180.67
<i>Turn over by employed *</i>	2001	4014		2486.75	8103	2199	3042.70
	2002-2009	32096	2025	3368.98	64819	2939	4579.04
<i>Gross investments by employed*</i>	2001	4014	111	150.40	8103	112	198.20
	2002-2009	32096	124	212.60	64819	111	178.38
<i>Long term debts by employed *</i>	2001	4014	538	972.80	8103	590	1211.11
	2002-2009	32096	662	2490.21	64819	728	2721.96
<i>Log wages by employed **</i>	2001	4014	12.17	0.44	8103	12.31	0.60
	2002-2009	32094	12.36	0.40	64808	12.47	0.58
<i>Profits by employed *</i>	2001	4014	103	386.98	8103	138	756.67
	2002-2009	32096	139	515.59	64819	268	1238.65

* In 1000 SEK

** Log, 1000 SEK

The difference that can be observed between the treatment and the untreated groups reflects the fact that the payroll tax cuts are a form of regional support. Firms are in general smaller in the treated regions than firms in the regions that serve as control. There are also differences in turnover per employed before treatment. Treated firms have an average turnover of 1.5 million SEK per employed while the firms used as controls have a turnover of around 2.2 million SEK. Prior to treatment the differences in gross investments, long-term debts and log of wage sums are rather small.

7. Results

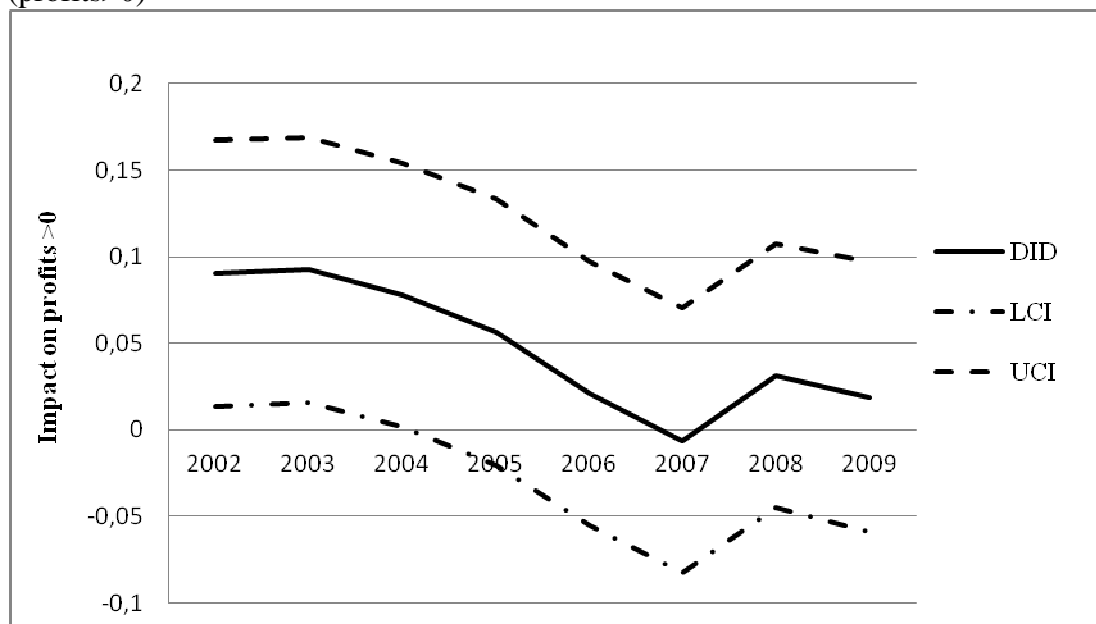
The presentation of the results follows the discussion in the section on theoretical expected results. The reduction in wage costs reduces the cost for the firm. We therefore can expect some effect on profits. Profits can be used in several ways: It could be used to lower prices in order for the firm to gain market shares. The second analysis is therefore on the impact on turnover. In the following sub-sections we present the analysis concerning impacts on factor of production and its prices, employment, wages, gross investments and long term debts. In all the analyses a multilevel approach is used which makes it possible to ascertain the extent to which the business climate, influences the outcome as well as how much of the variation in

outcome that is firm-specific. For all outcomes we have performed repeated cross-sectional analysis with 2001 as pre-treatment and 2002-2009 as post-treatment.

7.1. Impact on profits

Profits are here defined as the profits according to the accountings. In figure 3 and in all coming sub-sections regarding impacts, the results are graphically presented. The three lines in each figure represent, from the top down, the upper confidence interval bound (UCI), the difference-in-difference impact estimate (DID) and the lower confidence interval bound (LCI). This means that if 0 is included in the confidence bound it indicates an insignificant impact on the 5 per cent level. Detailed results are presented in the appendix.

Figure 2. Yearly impacts of reduced payroll taxes on firm profits according to accountings (profits>0)



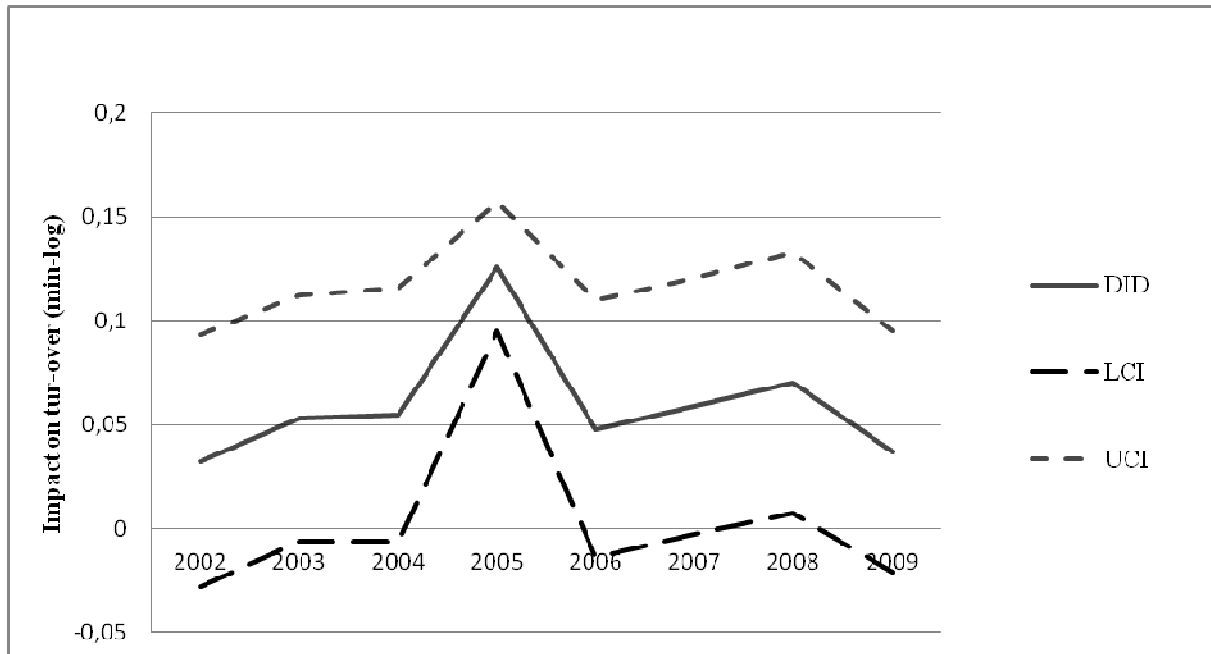
The part of the variation in profits that can be accounted for by the contest is around 38 per cent¹⁰, this also suggests the use of a multilevel model. The impact estimate on profits follows a clear business logic. Since the cuts in payroll taxes imply a decrease in the input price for labour we observe a rise in profits of approximately 8 per cent immediately after the reform and the impact is significant at a 5 per cent level for 2002, 2003 and 2004. This rise in profits will, however, decline over time and in 2005 the impact is insignificant. The impact on firm profits is thus short-lived.

¹⁰ The ICC is computed for each analysis and the computations are presented in Appendix.

7.2. Impact on turn-over

As above the reference year is 2001 and in Figure 3 the impact estimates is yearly, i.e. 2001 vs. 2002; 2001 vs. 2003. The turnover is in the statistics defined as gross turnover minus discounts, VAT and other taxes.¹¹ There are a few firms that had a net turnover that was below zero. Data have therefore been transformed by adding the highest negative net turnover to all other firms.¹² These firms have been excluded from the analysis presented here. The outcome used in the regressions is the log of net turnover. The impact estimates are presented in Figure 3.

Figure 3. Yearly impact on net turnover due to cuts in the payroll tax.



ICC is on average around 0.5. The interpretation is that almost 50 per cent of the variation in net turnover relates to the context for the firm. The high *ICC* also justifies the use of a multilevel approach. At the 5 per cent significance level we only have impacts for 2005 and 2008. The large impact for 2005 is, however, something that cannot be explained from the data available for this study and we suspect that there are some data problems for this year. However, if we allow for a little less certainty, the impact is significant at the 10 per cent level where we get significant impacts of around 5 per cent increase in net turnover for 2003-2008.

¹¹ In Sweden there are some additional taxes that are related to the product e.g. tobacco, petrol, electricity.

¹² Each observation j has been transformed according to. $y_j^* = \log(y_j + \min y)$ where y^* is the transformed turnover, y_j is the observed turnover and $\min y$ is the minimum of observed net turnover.

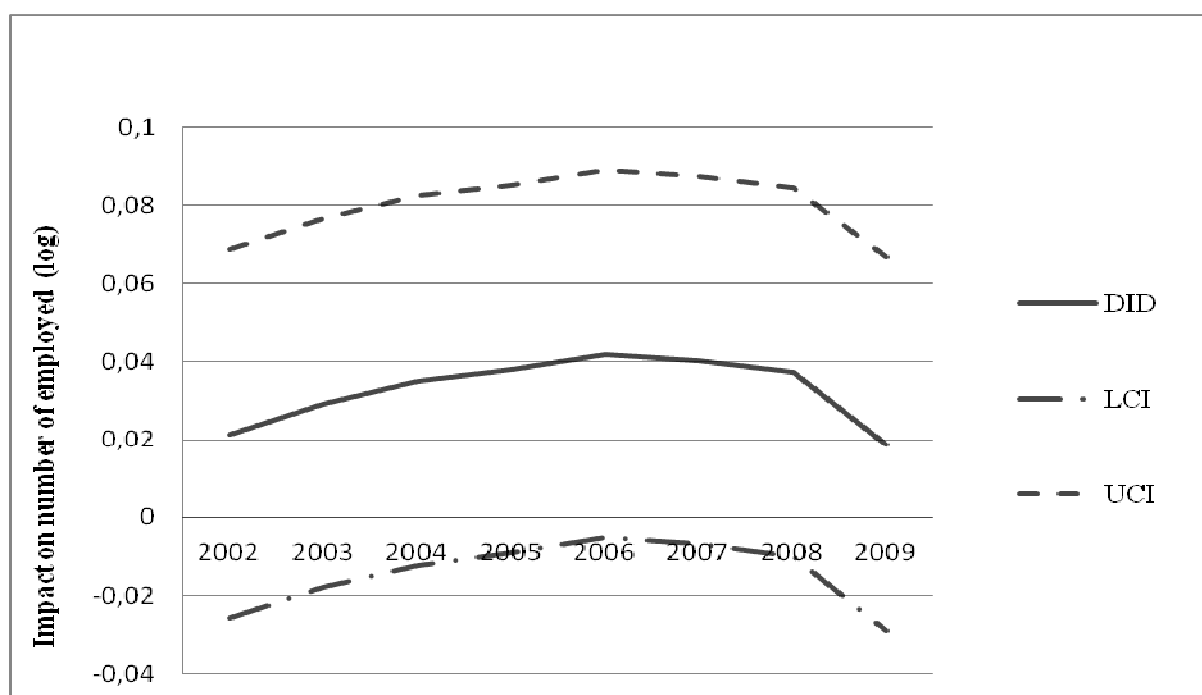
7.3. Impact on factors of production and factor prices

In the previous sub-sections we have described how profits and sales develop over the studied period. In the absence of inefficiency, to be able to increase production, firms need to increase its factors of production. In this section we report the impact on employment and capital, where capital is measured as gross investments. We also report the impact on factor prices.

7.3.1. Impact on employment

In this first analysis we investigate the impact on employment. Employment is here measured as the number of employed in logarithmic form. This is the same outcome that has been evaluated in almost all previous evaluations of payroll tax cuts. The yearly impact estimates and the corresponding confidence interval are presented in figure 3.

Figure 3. Yearly impact estimates of cuts in the payroll tax on employment.

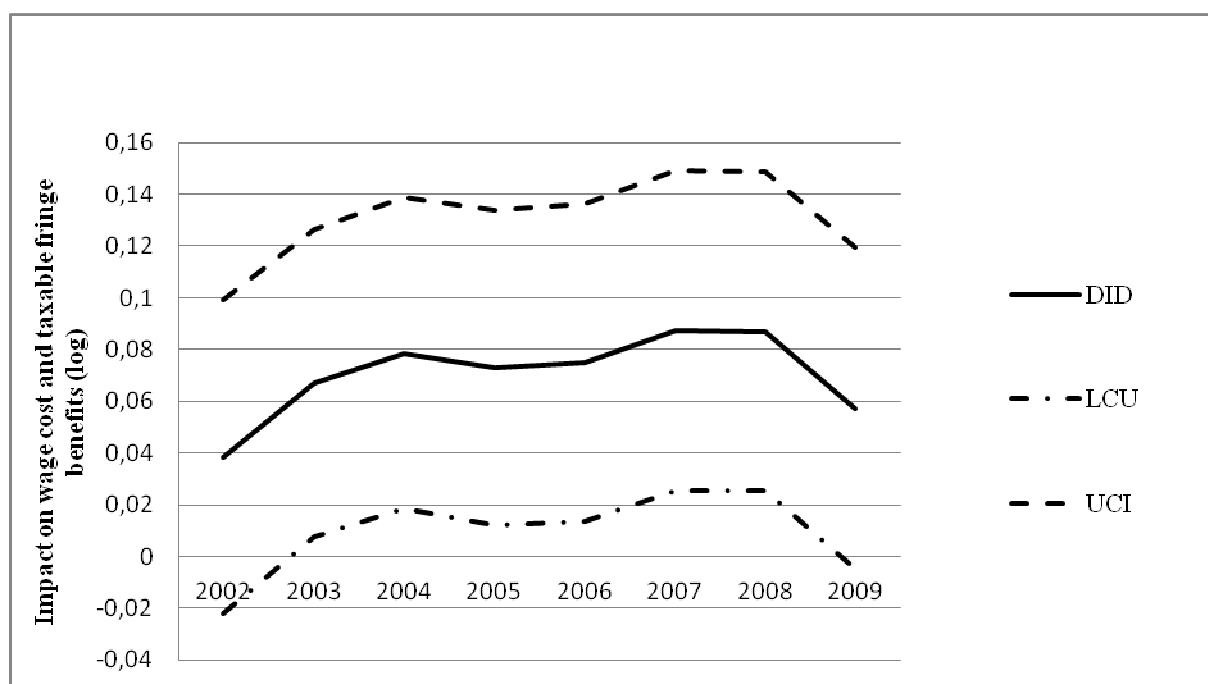


The *ICC* is for this analysis 0.56 which indicates that employment is to a large extent due to contextual factors. Since we measure the impact on employment in logarithmic form, the estimate should be interpreted as per cent change. A first observation is that, as in e.g. Bennis (2009), there are no significant employment effects of a cut in the payroll tax on the 5 per cent level. Allowing little less precision in the inference, there are impacts on the 10 per cent level of around 4 per cent in 2006 and 2007. However, the impact on employment is insignificant again for the years 2008 and 2009.

7.3.2. Impact on wages and other labour related taxable benefits

As previously discussed, owners of the firm can use the cut in payroll taxes to increase wages for their workers, increase their own wages, or for other taxable fringe benefits. As we also saw, there is indication of increased employment, which obviously implies increased wage cost. If constant returns to scale are assumed, we expect an increase in wages by fairly the same amount, around 4 per cent. The wage cost information is collected from the monthly tax declaration made by the firm and it includes both wages and taxable fringe benefits. The impact of wage cost is presented in figure 5.

Figure 5. Yearly impact of wage cost and taxable fringe benefits of a cut in the payroll tax.



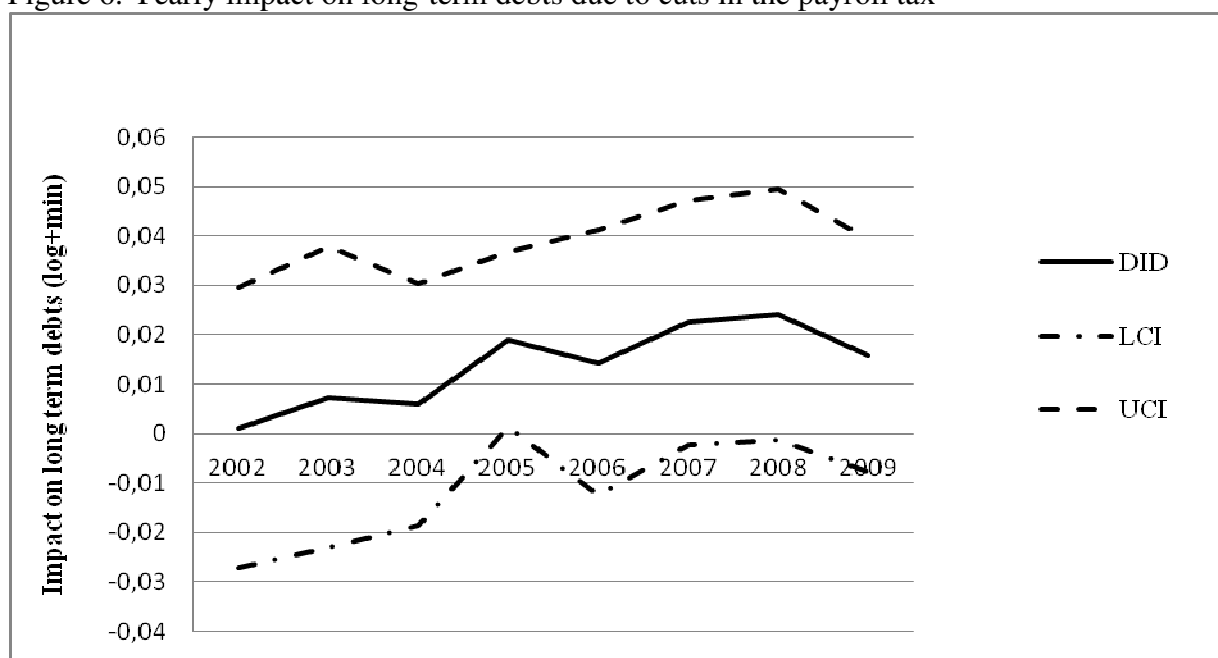
In this analysis the *ICC* is very large. On average 69 per cent of the variation of wage costs is due to contextual variation. It is not surprising since almost all firms in Sweden have a collective agreement stipulating minimum wages. In addition, the coverage rate of union membership is quite large in Sweden so only a small portion of the lower level wages is set within the firm. The increase in wages are for all years except the first and last (2002 and 2009) is significantly different from 0. The average wage increase is around 8 per cent which is twice the impact on employment. Unfortunately we do not have access to separate data on owners' wages, but the Swedish tax system is quite generous towards them: the total tax on profits is only 28 per cent. This makes it reasonable to suspect that a large part of the cuts in the payroll taxes is transferred to owners. Another shortcoming in the data, common to all

previous studies, is how employment is measured. Increased wage cost could be explained by the fact that people who are already employed are working longer hours. In this case we do not have any impact on employment, measured as number of employed, but will likely find increased costs.

7.3.3. Impact on long term debts

The impact on long-term debts has a conceptually complicated economic interpretation since the impacts on long-term debts to part is a consequence of investment decisions. Long-term debts include loans from banks and other financial firms or institutions and have a time horizon that spans several years. Positive long-term debts mean that the firms have borrowed money and negative means that the firm have been able to lend other firms. A positive cut in the payroll taxes means that either less positive or more negative debts. In figure 6 the results is reported for firms that initially had positive long-term debts.

Figure 6. Yearly impact on long-term debts due to cuts in the payroll tax



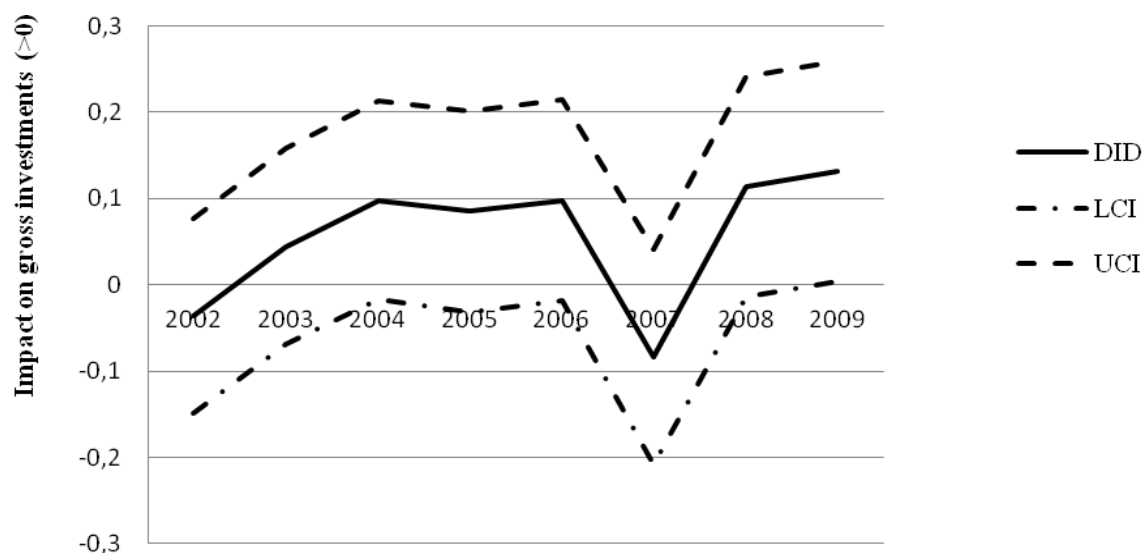
If the reduced payroll has a positive impact on long-term debt, it is expected that the long-term debts fall for the companies that initially have positive debts and increase for the company that lend money to other firms. Figure 6 shows the estimated annual impact of the reduction in payroll taxes. The long-term debts include, financing of investment and even here there is an interaction with other variables. Such a variable is the gross investment. If an increased gross investment is financed with borrowed funds it will lead to an increase in long-term debt in yearly financial statement. Hence, the impact on

long-term debts should be evaluated jointly with gross investments. Overlooking the sharp fall in gross investments in 2007, the trends for long-term debts and gross investments follow each other over the years. At the beginning of the period there are no significant effects on either the 5 or 10 percent significance level. In 2005, there is a significant increase in long-term debt by 2 percent at 5 percent significance level. The same effect is also found in 2007 and 2008, but at a significance level of 10 percent.

7.3.4. Impact on gross investments

Gross investments measure the amount of additional capital in the firm. In the analysis presented in figure 7 we use only firms with positive gross investments according to the accountings. The interest rate of the long term debts can be seen as one part of the price of capital. Reducing debts thus means that the price of capital decreases. According to theory, a reduced price of capital would in some cases and depending on the technology imply a higher use of capital, in other words increased gross investments.

Figure 7. Yearly impact on gross investments of a reduction in payroll taxes. (gross investments > 0).



As can be expected the context influence is lesser for gross investments. ICC is here on average 0.2 which is interpreted as that 20 per cent in the variation of gross investments is due to contextual factors and 80 per cent is firm-specific. In 2002-2004, the development is similar to that of employment – the impact is growing but insignificant. There is a significant effect for only two years, 2007 and 2009. On a 10 per cent significance level there are also significant impacts in 2004 and 2006. It is, however, clear that the effects on gross

investments come later in the process. One explanation for the dip in 2007 could be the financial crisis. The pattern produced would have to assume that firms in treated areas reacted more quickly to the financial downturn and recovered more rapidly than untreated firms. Another, and perhaps more likely explanation, is data problems for this year with respect to gross investments.

8. Conclusions and concluding remarks

In this study we have evaluated a cut in the payroll tax launched in Sweden in 2002. In contrast to previous evaluations of this kind of support, we use a firm perspective and use several possible outcomes. This is because support like the cut in payroll taxes is not designed for a specific purpose. This means that firms can use the support as they like. Further, in contrast to previous evaluations we use a longer time horizon. Our follow up period is eight years. Finally, we methodologically address the question on how this type of regional support could be evaluated, taking into account firms are nested within regions. This is done by using multilevel analysis.

The results show a logical development from both the business and a theoretical perspectives. In the beginning of the period profits and turnover increases. These profits are later transformed into increased wages and other benefits directed to the personnel. We do suspect, without being able to control for it, that a non neglectable part of the increase in wages and other benefits is compensation to the owners. When this occurs, profits are reduced. Even later we can see an increase in long-term debts and the last year we also saw indications of additional investments.

There are some implications of this evaluation. First, the effects seem short-term. There are signs that the support introduces some type of growth within the firm, however, in light of the development of profits this growth is likely to disappear in the long run. This is also what can be expected from a general equilibrium perspective. The cut in the payroll tax will after a while create a new equilibrium where the difference in profits between supported and non-supported firms are neglectable. A second implication pertains to the design of the support and the expectations stated by, in our case, the government. Support directed to firms and designed like the cut in payroll taxes needs to be evaluated on several possible outcomes. If a support is expected to have specific impacts, it has to be designed so that measures in reality

are related to the expected outcome, such as employment support that can be used only to hire personnel.

From a methodological point of view there are also some implications for future evaluations of regional subsidies or regional policy in general. For all outcomes there is a relatively high *ICC*. This implies that context is important for the outcome and that a multilevel analysis approach is suitable for this kind of evaluation. It should be mentioned that the evaluation presented here contains a rather simple form of multilevel analysis and more empirical research is needed.

Another methodological aspect of the study is related to the lack of impacts. In scientific work it is common to use a significance level of one or five per cent to say that there are significant impacts, at least when using reasonably large samples. In the evaluation we also discuss impact on ten per cent level. This is not due to a lowered ambition and a hunt for significant impacts. Instead this is because we strongly suspect that there are power problems. For example, like most other evaluations we do not find any impacts on employment. One interpretation of the result is, of course that there are no impacts. However, one statistical problem needs to be highlighted. The possibility to identify impacts relates to the fact that an appropriate model is used, but also on available data and how this data has been constructed. In principle, the richer and more precise the data and the more precise the instruments used, the smaller the impacts that can be detected. We have access to rich data in terms of observation and variables and we do believe we are using the correct model. However, the data is constructed for a completely different purpose than for evaluating the cut in payroll tax. A potential risk is thus that the impacts are so small that we, with accessible data, are unable to identify these small impacts. One needs to bear in mind that the maximum reduction in costs due to the cut in payroll taxes is around 80.000SEK (\$11.000). To give some perspectives; with our data on employment measured as number of employed we need an increase of 2.6 persons in order to get a significant impact. This amount is quite high for a small firm. If data instead was measured in working hours we could have measured impacts of increased working time of the existing work force. To avoid this kind of problem in the future, policy makers need to adopt an evaluation perspective early in the process of designing supports.

To conclude: Have payroll tax cuts been successful? Our evaluation demonstrates that the cut in payroll tax, to the amounts in the Swedish case, have had some but weak immediate impacts but uncertain long-term effects. Further, there is a risk that the eventual impacts are so small that we have not been able to identify these with existing data and methods. A possible strategy would be to increase the amount of the cuts and thereby increase the impact size. However, if this is done, displacement effects must be considered. This was not done in this evaluation.

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Appendix

The statistical results for the different outcomes are in detail presented below. For each outcome and each sub sample there are two tables. Table labelled (a) presents the results of the model and tables labelled (b) show the result for the municipality level. For some profits and gross investments we have only presented the result for positive values in the main text. Tables' labelled (c) and (d) report the estimate for negative values. The first column in tables labelled (a) gives the year for which the situation in 2001 is compared. The estimated parameters and the corresponding standard errors are presented. *DID* is the difference-in-difference estimate, before-after is 2001 compared with the corresponding year stated in the first column and treated is the raw comparison between treated and untreated. Finally, the number of firms in the specific analysis is stated. In tables labelled (b) the first column shows the standard deviation (σ_j) for municipality variation. This corresponds to ε_j in equation [3]. In the third column the standard deviation on firm level ($\sigma_{i,j}$) is presented. This corresponds to $\varepsilon_{i,j}$ in equation [2]. The inter class correlation (*ICC*) is defined and computed as $\sigma_j^2 / (\sigma_j^2 + \sigma_{i,j}^2)$.

Table 1a. Estimated parameters for impact on profits (>0)

Year	Constant		DID		Before/After		Treated		Obs.
	Coeff	s.e.	Coeff	s.e.	Coeff	s.e.	Coeff	s.e.	
2002	7.08	0.40	0.09	0.04	-0.20	0.02	-0.46	0.07	34555
2003	7.12	0.65	0.09	0.04	-0.22	0.02	-0.38	0.07	34545
2004	6.87	0.53	0.08	0.04	-0.19	0.02	-0.38	0.06	34991
2005	7.64	0.91	0.06	0.04	-0.13	0.02	-0.35	0.07	35380
2006	5.03	1.57	0.02	0.04	-0.01	0.02	-0.32	0.06	36053
2007	6.98	1.58	-0.01	0.04	0.08	0.02	-0.35	0.06	36541
2008	8.46	1.57	0.03	0.04	0.09	0.02	-0.31	0.06	36995
2009	6.98	1.58	0.02	0.04	0.09	0.03	-0.43	0.06	35532

Table 1b. Municipality and firm level error variation - profits (>0)

Level 1: Municipality					
Year	Municipality		Firm		ICC
	Std.dev	s.e.	Std.dev	s.e.	
2002	1.22	0.08	1.55	0.01	0.38
2003	1.32	0.09	1.54	0.01	0.42
2004	1.21	0.08	1.55	0.01	0.38
2005	1.22	0.08	1.56	0.01	0.38
2006	1.26	0.08	1.56	0.01	0.40
2007	1.26	0.08	1.57	0.01	0.39
2008	1.33	0.08	1.56	0.01	0.42
2009	1.28	0.08	1.58	0.01	0.39

Table 1c. Estimated parameters for impact on profits (≤ 0)

Year	Constant		DID		Before/After		Treated		Obs.
	Coeff	s.e.	Coeff	s.e.	Coeff	s.e.	Coeff	s.e.	
2002	6.25	0.41	0.30	0.08	0.59	0.04	-0.73	0.10	26788
2003	6.29	0.67	0.30	0.08	0.57	0.04	-0.64	0.10	26788
2004	6.06	0.55	0.29	0.08	0.61	0.04	-0.63	0.10	27224
2005	6.88	0.94	0.26	0.08	0.66	0.04	-0.60	0.10	27613
2006	4.30	1.62	0.23	0.08	0.78	0.04	-0.57	0.10	28286
2007	6.28	1.63	0.22	0.08	0.86	0.04	-0.62	0.10	28774
2008	7.59	1.63	0.25	0.08	0.88	0.04	-0.57	0.09	29228
2009	12.57	1.63	0.18	0.08	1.00	0.05	-0.63	0.10	27765

Table 1d. Municipality and firm level error variation - profits (≤ 0)

Level 1: Municipality					
Year	Municipality		Firm		ICC
	Std.dev	s.e.	Std.dev	s.e.	
2002	1.13	0.08	1.60	0.01	0.33
2003	1.22	0.09	1.59	0.01	0.37
2004	1.13	0.08	1.60	0.01	0.33
2005	1.14	0.08	1.62	0.01	0.33
2006	1.18	0.08	1.61	0.01	0.35
2007	1.15	0.08	1.62	0.01	0.34
2008	1.24	0.08	1.61	0.01	0.37
2009	1.17	0.08	1.62	0.01	0.34

Table 2a. Estimated parameters for impact on net turn-over ($\log(y + y_{\min})$)

Year	Constant		DID		Before/after		Treated		Obs.
	Coeff.	s.e.	Coeff.	s.e.	Coeff.	s.e.	Coeff	s.e.	
2002	10.88	0.34	0.03	0.03	-0.55	0.02	-0.45	0.05	36730
2003	10.55	0.55	0.05	0.03	-0.51	0.02	-0.41	0.05	36720
2004	8.34	0.45	0.05	0.03	-0.50	0.02	-0.41	0.05	37166
2005	9.06	0.40	0.13	0.02	2.53	0.01	-0.29	0.03	37555
2006	7.91	1.36	0.05	0.03	-0.43	0.02	-0.41	0.05	38228
2007	7.92	1.35	0.06	0.03	-0.38	0.02	-0.45	0.05	38716
2008	8.69	1.45	0.07	0.03	-0.37	0.02	-0.43	0.05	39170
2009	10.63	1.27	0.04	0.03	-0.18	0.02	-0.47	0.05	37707

Table 2b. Municipality and firm level error variation – net turn-over ($\log(y + y_{\min})$)

Level 1: Municipality					
Year	Municipality		Firm		ICC
	Std.dev	s.e.	Std.dev	s.e.	
2002	1.37	0.08	1.31	0.00	0.52
2003	1.41	0.08	1.28	0.00	0.55
2004	1.31	0.08	1.32	0.00	0.50
2005	0.74	0.04	0.68	0.00	0.55
2006	1.34	0.08	1.35	0.00	0.50
2007	1.34	0.08	1.34	0.00	0.50
2008	1.40	0.08	1.38	0.00	0.51
2009	1.38	0.08	1.26	0.00	0.55

Table 3a. Estimated parameters for impact on log employed

Year	Constant		DID		Before/After		Treated		Obs.
	Coeff	s.e.	Coeff	s.e.	Coeff	s.e.	Coeff	s.e.	
2002	3.55	0.27	0.02	0.02	-0.21	0.01	-0.41	0.04	36730
2003	3.27	0.44	0.03	0.02	-0.21	0.01	-0.38	0.04	36720
2004	1.99	0.35	0.04	0.02	-0.22	0.01	-0.38	0.04	37166
2005	1.84	0.60	0.04	0.02	-0.20	0.01	-0.37	0.04	37555
2006	1.93	1.03	0.04	0.02	-0.20	0.01	-0.33	0.04	38228
2007	1.90	1.04	0.04	0.02	-0.19	0.01	-0.39	0.04	38716
2008	1.49	1.09	0.04	0.02	-0.18	0.01	-0.31	0.04	39170
2009	4.23	1.04	0.02	0.02	-0.12	0.02	-0.39	0.04	37707

Table 3b. Municipality and firm level error variation – log employed

Level 1: Municipality					
Year	Municipality		Firm		ICC
	Std.dev	s.e.	Std.dev	s.e.	
2002	1.16	0.06	1.02	0.00	0.57
2003	1.17	0.07	1.02	0.00	0.57
2004	1.17	0.07	1.03	0.00	0.57
2005	1.17	0.07	1.02	0.00	0.56
2006	1.18	0.07	1.02	0.00	0.57
2007	1.19	0.07	1.03	0.00	0.57
2008	1.25	0.07	1.03	0.00	0.59
2009	1.22	0.07	1.03	0.00	0.58

Table 4a. Estimated parameters for impact on log wages and other wage benefits

Year	Constant		DID		Before/After		Treated		Obs.
	Coeff	s.e.	Coeff	s.e.	Coeff	s.e.	Coeff	s.e.	
2002	16.63	0.35	0.04	0.03	-0.28	0.02	-0.72	0.05	36713
2003	16.22	0.56	0.07	0.03	-0.22	0.02	-0.64	0.05	36707
2004	14.42	0.46	0.08	0.03	-0.21	0.02	-0.65	0.05	37154
2005	14.32	0.78	0.07	0.03	-0.18	0.02	-0.65	0.05	37551
2006	13.97	1.35	0.08	0.03	-0.16	0.02	-0.60	0.05	38213
2007	14.25	1.36	0.09	0.03	-0.13	0.02	-0.68	0.05	38697
2008	18.71	1.36	0.09	0.03	-0.09	0.02	-0.57	0.05	39120
2009	18.77	1.36	0.06	0.03	0.03	0.03	-0.70	0.05	37657

Table 4b. Municipality and firm level error variation – log wages and other wage benefits

Level 1: Municipality					
Year	Municipality		Firm		ICC
	Std.dev	s.e.	Std.dev	s.e.	
2002	1.93	0.10	1.31	0.00	0.68
2003	1.95	0.10	1.28	0.00	0.70
2004	1.97	0.11	1.30	0.00	0.70
2005	1.90	0.10	1.32	0.00	0.68
2006	1.94	0.10	1.34	0.00	0.68
2007	1.93	0.10	1.35	0.00	0.67
2008	2.08	0.11	1.35	0.00	0.70
2009	2.06	0.11	1.34	0.00	0.70

Table 5a. Estimated parameters for impact on log long term debts ($\log(y + y_{\min})$)

Year	Constant		DID		Before/After		Treated		Obs.
	Coeff	s.e.	Coeff	s.e.	Coeff	s.e.	Coeff	s.e.	
2002	9.29	0.16	0.00	0.01	-0.70	0.01	-0.10	0.03	36730
2003	9.27	0.28	0.01	0.02	-0.93	0.01	-0.11	0.03	36720
2004	9.59	0.18	0.01	0.01	-0.19	0.01	-0.08	0.02	37166
2005	8.98	0.22	0.02	0.01	1.47	0.01	-0.07	0.02	37555
2006	8.75	0.59	0.01	0.01	-0.54	0.01	-0.07	0.02	38228
2007	8.78	0.54	0.02	0.01	-0.28	0.01	-0.08	0.02	38716
2008	9.02	0.58	0.02	0.01	-0.32	0.01	-0.08	0.02	39170
2009	8.89	0.51	0.02	0.01	0.18	0.01	-0.09	0.02	37707

Table 5b. Municipality and firm level error - log long term debts ($\log(y + y_{\min})$)

Level 1: Municipality					
Year	Municipality		Firm		ICC
	Std.dev	s.e.	Std.dev	s.e.	
2002	0.63	0.04	0.61	0.00	0.52
2003	0.64	0.04	0.66	0.00	0.49
2004	0.50	0.03	0.53	0.00	0.47
2005	0.31	0.02	0.38	0.00	0.39
2006	0.53	0.03	0.58	0.00	0.45
2007	0.51	0.03	0.54	0.00	0.47
2008	0.49	0.03	0.55	0.00	0.44
2009	0.46	0.03	0.51	0.00	0.45

Table 6a. Estimated parameters for impact on log gross investments (>0)

Year	Constant		DID		Before/After		Treated		Obs.
	Coeff	s.e.	Coeff	s.e.	Coeff	s.e.	Coeff	s.e.	
2002	6.92	0.58	-0.04	0.06	-1.10	0.03	-0.34	0.09	36730
2003	8.08	0.97	0.04	0.06	-1.13	0.03	-0.38	0.10	36720
2004	5.57	0.80	0.10	0.06	-1.21	0.03	-0.40	0.09	37166
2005	5.48	1.39	0.09	0.06	-1.20	0.03	-0.35	0.10	37555
2006	2.04	2.40	0.10	0.06	-1.16	0.03	-0.41	0.10	38228
2007	3.48	2.58	-0.08	0.06	-2.63	0.04	-0.48	0.10	38716
2008	7.01	2.74	0.11	0.04	-1.89	0.04	-0.33	0.10	39170
2009	9.90	2.63	0.13	0.07	-2.07	0.05	-0.52	0.10	37707

Table 6b: Municipality and firm level error variation – log gross investments (>0)

Level 1: Municipality

Year	Municipality		Firm		ICC
	Std.dev	s.e.	Std.dev	s.e.	
2002	1.22	0.09	2.30	0.01	0.22
2003	1.18	0.09	2.32	0.01	0.20
2004	1.18	0.09	2.35	0.01	0.20
2005	1.18	0.09	2.39	0.01	0.20
2006	1.23	0.09	2.39	0.01	0.21
2007	1.26	0.10	2.57	0.01	0.19
2008	1.39	0.11	2.63	0.01	0.22
2009	1.30	0.10	2.60	0.01	0.20

Table 6c. Estimated parameters for impact on log gross investments (≤ 0)

Year	Constant		DID		Before/After		Treatedt		Obs.
	Coeff	s.e.	Coeff	s.e.	Coeff	s.e.	Coeff	s.e.	
2002	2.15	0.61	0.05	0.12	3.54	0.07	-0.44	0.15	26473
2003	3.27	1.01	0.10	0.12	3.55	0.07	-0.46	0.15	26463
2004	0.72	0.83	0.15	0.13	3.46	0.07	-0.45	0.15	26909
2005	0.66	1.46	0.13	0.13	3.47	0.07	-0.41	0.15	27298
2006	-2.89	2.53	0.12	0.13	3.50	0.07	-0.45	0.15	27971
2007	-1.59	2.73	-0.04	0.14	2.15	0.08	-0.54	0.16	28459
2008	8.42	2.83	0.19	0.14	2.74	0.08	-0.42	0.17	28913
2009	10.17	2.74	0.15	0.14	2.90	0.10	-0.56	0.17	27450

Table 6d. Municipality and firm level error variation - log gross investments (≤ 0)

Level 1: Municipality

Year	Municipality		Firm		ICC
	Std.dev	s.e.	Std.dev	s.e.	
2002	1.08	0.09	2.39	0.01	0.17
2003	0.95	0.09	2.42	0.01	0.13
2004	0.96	0.09	2.46	0.01	0.13
2005	0.99	0.09	2.50	0.01	0.14
2006	1.02	0.09	2.51	0.01	0.14
2007	1.10	0.11	2.71	0.01	0.14
2008	1.22	0.11	2.80	0.01	0.16
2009	1.11	0.10	2.73	0.01	0.14

