

# DO TRAIN-OR-PAY SCHEMES REALLY INCREASE TRAINING LEVELS?

BENOIT DOSTIE<sup>†</sup>

ABSTRACT. Reacting to perceived market failures leading to under-optimal levels of firm-sponsored training, governments all over the world have stepped in with different policy instruments to alleviate this problem, using incentives such as regulation or co-financed schemes directed at firms or at individuals. Despite their widespread use, rigorous empirical evaluation of such policies are uncommon. In this paper, we provide a careful evaluation of a reform in a train-or-pay scheme used in Canada which exempted medium-sized workplace from the training requirement. Our identification strategy involves comparing changes in training levels in medium-sized workplaces, before and after the reform, to changes for both smaller and larger workplaces. We also compare relative changes in training intensities to those observed in a neighboring province in which no such changes took place. We find the policy had no impact on training levels but caused firms to change their human capital investments portfolio, substituting informal and formal training.

---

*Date:* August 27th 2012.

§PRELIMINARY. We thank HEC Montréal for funding. We thank Rajshri Jayaraman, Claude Montmarquette and Daniel Parent for comments. The usual caveat applies.

<sup>†</sup> Institute of Applied Economics, HEC Montréal, Montréal (Québec), H3T 2A7 ; IZA, CIRANO and CIRPÉE; benoit.dostie@hec.ca.

## 1. INTRODUCTION

It is widely thought that workplaces under-invest in employee training. The theoretical foundation for this (reviewed in Leuven (2005)) is the presence of labor market imperfections and credit constraints, which may impede workers' or firms' ability to either finance or capture the rents from training.<sup>1</sup>

Governments around the world have responded to those perceived market failures by devising policies aimed at encouraging firms and workers to increase their investment in training. It is surprising, in view of this, that rigorous impact assessments of these policies are virtually absent. Bassanini, Booth, Brunello, Paola, and Leuven (2007) provide a comprehensive review of the different policy instruments used by governments ranging from subsidies directed to the firms or individual to broad ranging regulations, and lament the absence of "rigorous empirical evaluations of their effectiveness" (p. 284). They add that "many investigations provide only descriptive statistics with no counterfactual for the assessment of the policy impact" (p. 303).

Among the few exceptions that are closest to our research, Abramovsky, Battistin, Fitzsimons, Goodman, and Simpson (2011) evaluate the effectiveness of the UK Employer Training Pilots in raising training levels for low-skilled workers and find no evidence that the program indeed raised those. Leuven and Oosterbeek (2004) examine the impact of a tax deduction for training older workers in the Netherlands and find that it led workers to postpone training and did not raise aggregate training incidence.

One of the reasons for this lack of evidence is that regulations governing firm-sponsored worker training are typically determined at the national level and tend to change infrequently over time (Almeida and Aterido (2008)). Heterogeneity across countries as well as lack of variation in treatment therefore make it difficult to assess the impact of such policies. In this paper, we overcome this difficulty by using a workplace panel data set, and exploiting a sub-national policy change pertaining to a training levee applied to some firms but not others.

In 1995, the Canadian province of Quebec introduced a training levy. Formally titled the "Act to Foster the Development of Manpower Training", the law is commonly known Bill 90 or the "1% law", reflecting its key requirement that firms devote one per cent of their payroll towards training, or submit an equivalent amount to the Quebec Minister

---

<sup>1</sup>The seminal paper here is Becker (1964), and other prominent recent contributions include Acemoglu and Pischke (1999), Stevens (1994), Stevens (2001), and Katz and Ziderman (1990)

of Revenue.<sup>2</sup> On January 1st 2004, a reform of Bill 90 exempted medium-sized (i.e. with payroll below \$1 million) workplaces from the law’s 1% requirement.

Training levees, such as the one used in Quebec, are one good example of policies used by governments to influence firm-sponsored training. An important policy question is whether they serve their intended purpose – to raise training levels. We use this change in the law as a natural experiment to answer two related questions. First, did the Quebec training levee increase training levels? Second, how did it effect the portfolio of workplaces training investments?

To answer these questions, we use the Workplace and Employee Survey (WES) 1999-2006 from Statistics Canada.<sup>3</sup> This longitudinal linked employer-employee data set provides us with detailed information on the training policies of the firm, in particular the number of workers undertaking classroom and on-the-job training in a given year. It also provides us with detailed payroll data, which allows us to identify which firms were subject to Bill 90 as well as its partial repeal.

When comparing the raw incidence of training before and after the reform for medium-sized firms, we find a decrease of 13.2% in the incidence of classroom training and an increase of 10.4% in the incidence of on-the-job training. These movements in opposite directions suggest that the law had a negligible impact on aggregate training levels. It seems that firms simply substituted on-the-job training for classroom training for the purposes of meeting the law’s requirement.

This conclusion holds when estimate the impact of Bill 90 on training levels by using this reform as a natural experiment, computing difference-in-difference estimators, comparing training levels in medium-sized workplaces, before and after the reform, to changes for both smaller and larger workplaces. Our robustness checks include estimating these changes taking into account observable workplace characteristics, and using triple-difference estimators comparing relative changes in training intensities to those observed in Ontario, a neighboring province in which no such changes took place.

## 2. THE QUEBEC TRAINING LEVEE LAW

On June 22<sup>nd</sup> 1995, the Quebec government passed the ‘Act to Foster the Development of Manpower Training’. This law, commonly known as Bill 90, mandates firms to

---

<sup>2</sup>The more commonly known French title of the law is “Loi favorisant le développement de la formation de la main-d’oeuvre.”

<sup>3</sup>The first round of WES was conducted in 1999 and we use all available years of data from this survey.

spend at least 1% of their payroll on training. Firms spending less than 1% must remit the difference to the Quebec government, hence the train-or-pay scheme moniker.<sup>4</sup>

In the summary analysis provided by Bassanini et al. (2007), the advantages of train-or-pay schemes are its low cost of administration and a purported effectiveness in increasing training investments. Among co-financed schemes directed at firms, the low administrative cost is compared to levy-grand schemes in which requires administrative bodies which decides on what training programs are implemented. Given disadvantages are (possibly) low training quality and high expected deadweight loss.

The law includes detailed information on the type of training that qualifies. Only transferable skill-related structured training that is directly related to the job or that is recognized by other workplaces qualifies. Structured training must impart or improve skills necessary for doing one's job (see Gouvernement du Québec (1998)).

On January 1st 1996, all firms with payroll over \$1,000,000 were subject to the law, but in the following year, this was extended to cover firms with a payroll of over \$500,000, and from 1998 onwards, all firms with payroll over \$250,000 were subject to the law.<sup>5</sup>

On June 12th, 2003 as part of the 2003-2004 budget, the Quebec government promised a repeal of the 1% law for workplaces with payroll of less than 1 million dollars. The government contended, as its rationale for this proposal, that the costs of administrative paperwork incurred by medium-sized workplaces to demonstrate compliance to the law exceeded the benefits proffered by the law itself.<sup>6</sup>

This is somewhat corroborated by compliance to the law (Emploi Québec (2005)). Compliance was much higher for firms with payroll over \$1,000,000 (between 86.8% and 88.2% over the 2000-2003) than for firms with payroll between \$250,000 and \$500,000 (67.9% to 70%).<sup>7,8</sup> It is interesting to note that, among the most frequent

---

<sup>4</sup>The law replaced a tax credit for training expenses that was abandoned due to its high complexity and high administrative burden (Emploi Québec (2000)).

<sup>5</sup>While the sequential nature of the implementation of the law would allow us to measure to what extent firms are substituting between different types of training, there are unfortunately no data set available with the required information for this time period.

<sup>6</sup>The law was and still is very unpopular with workplaces. See for example Conseil du Patronat du Québec (2006) who give specific examples of the administrative burden faced by workplaces with respect to the law.

<sup>7</sup>Compliance rates were marginally lower over the preceding 5 years period (Emploi Québec (2000)).

<sup>8</sup>In 2004, 1,169 firms didn't meet the 1% requirement and paid a total of 14.6 million dollars to the Government as a penalty (Direction du Fonds national de formation de la main-d'oeuvre (2005)). Such funds are used by the Government to subsidize many activities including research project on training policy as well as training proposals made by workplaces.

reasons provided for not complying, are that the workplace perceives training as providing few benefits relative to its cost and increased fears of increased mobility of trained workers. Also frequently mentioned are difficulties in planning, organizing and providing training activities.

The modification to Bill 90, repealing the application of the the law for smaller firms, was officially proposed by the responsible Ministry on October 1st 2003, approved by the Parliament on December 10th, and started being effective on January 1st, 2004. This reduced the number of firms subjected to the 1% levee from 37,346 in 2003 to 10,832 in 2004. The law, which still applies to the majority of employees (though not firms) working in the private sector, remains unpopular among businesses, who have persistently lobbied for its repeal (Haroun (2005)).

### 3. DATA

Our analysis uses data from the WES. Started in 1999 with an initial sample of 5 440 Canadian workplaces, the WES contains detailed information on a workplace's workforce, vacancies, human resources practices and most importantly for our purposes, training activities and payroll data.<sup>9</sup> Workplaces are sampled from the Business Registry and followed over time with sampling adjustments every two years to keep the sample representative.<sup>10</sup>

It should be noted that while the workplaces sample is meant to be representative for the universe of Canadian workplaces, this is not necessarily the case with provincial subsamples. Fortunately, those are representative for the biggest provinces i.e. British Columbia, Alberta, Ontario and Quebec.

Since the WES provides annual data, and because of the timing of the change in the law, the most direct comparison we can use to evaluate the impact of the reform would be to look at training incidence and intensity in 2003 and 2004. However, data from 2004 refers to the year ending on March 31st. Therefore, the first complete year of data post reform is 2005. Moreover, another reason to use 2005 as the first post-reform year is because workplaces are re-sampled on odd years: the representativeness of the 2004 sample hinge on Statistics Canada sampling weights correctly reflecting attrition.

It is also worth emphasizing that the WES was not designed for the evaluation Bill 90. The main difference is that the law applies to firm while WES samples workplaces.

---

<sup>9</sup>It should be also noted that except for the provided information about the workplace's payroll, there is no direct information in WES about which workplaces are subject to the law.

<sup>10</sup>The WES is defined as a linked employer-employee data set in which both the employer and employee samples are representative of their respective population by Abowd and Kramarz (1999). However, we do not use the employee sample for our analysis.

This leads to the possibility that some workplaces in our sample are misclassified as small firms whereas their total payroll (when adding the payroll of other workplaces belonging to the same firm) would classify them as large firms subject to the law.

This misclassification result in a smaller training differential between large and small workplaces, and between large and medium-sized workplaces. Since they most likely muddle differences between our treatment and control groups, this will lead to a downward bias in our estimate of the reform. In any case, since our main conclusion involve comparing the impact of the reform on different types of training, using the same classification of workplaces according to their size, we are confident our results are robust to possible misclassification.

We capture “standard training” as mandated under Bill 90 through the incidence of classroom training. This seems like a good proxy, since classroom training in WES is explicitly defined as all training activities which have pre-determined format, including a pre-defined objective, specific content and progress may be monitored and/or evaluated, and it is most often provided by an instructor who is not an employee of the workplace. WES separately measures the incidence of on-the-job training, described as informal, usually taking place during working hours, and provided by a colleague or a supervisor. If the 1% training mandate is binding for firms, we expect medium-sized workplaces to respond to the repeal by substituting away from classroom training towards on-the-job training.

We measure training levels in two ways. First, by constructing two dichotomous variables measuring the incidence of training. These variables are equal to one if the workplace offers any classroom or on-the-job training respectively, and zero otherwise. Second, we construct two variables measuring the intensity of training. These variables are equal to the ratio of the total number of employees receiving classroom (on-the-job) training - as provided by the employer - over the year divided by the number of employees at the workplace on March 31st of the current year.

#### 4. EMPIRICAL STRATEGY

Since our data comprise a workplace panel observed from 1999 to 2005, we exploit two sources of variation generated by this policy change. First, after 2003, Bill 90 was repealed for businesses with a payroll under \$1 million. Two group of firms within Quebec were not affected by this change. The law continued to apply to workplaces with payroll over \$1 million, and workplaces with payrolls under \$250,000 continued to be exempt.

This creates a clearly defined treatment group within Quebec: “medium-sized” firms, i.e. those whose payrolls were between  $\$ \frac{1}{4}$  million and  $\$1$  million. The control group comprises all other workplaces that were not affected by the change in the law. However, since the law applied to businesses in Quebec, but not in the neighboring province of Ontario, or indeed anywhere else in the rest of Canada, workplaces from other provinces can also be used as a control group.

We exploit variation in treatment based on firm size through a difference-in-difference strategy, which compares changes in training and productivity in medium-sized firms (the treatment group) relative to the small and large firms (the control group).<sup>11</sup> We exploit the additional variation at the provincial level by estimating a triple difference wherein changes in outcomes between treatment and control firms in Quebec are compared to analogous changes in Ontario and (separately) the rest of Canada, where there was no such change in mandated training policies.

## 5. PRELIMINARY ANALYSIS

**5.1. Training incidence.** Raw data on training incidence and training intensity at the workplace level are presented in Tables 1 and 2 for Quebec and Ontario by year and workplace size. The Tables show the usual finding that bigger firms are both more likely to offer training, and when they do so, train more workers.

Focusing first on training incidence in Table 1, we see that, indeed, it does seem that following the Bill 90 reform, medium-sized workplaces cut back on their classroom training efforts. 56.5% of medium-sized workplaces offered classroom training in 2003 but only 49% did the same in 2005, a drop of 7.5 percentage points or -13.3%. Among small workplaces which we never subject to the law, classroom training incidence is mostly stable at 17.5% and 18% in 2003 and 2005 respectively but we also observe a diminishing classroom training incidence for bigger firms but the drop is only 2%. In other words, classroom training incidence dropped more sharply for medium sized firms following the repeal of Bill 90 for this group.

Comparing these movements to those observed in Ontario, we observed that the training incidence increased for both smaller (+4.5%) and bigger (+6.3%) workplaces and decreased for medium-sized workplaces (-7.5%). Because of the rises in the control groups, we see the relative decrease in the incidence of training for medium-sized workplaces is similar in Ontario than in Quebec. Estimating a triple-difference would thereby correct for the training trend particular to medium-sized firms.

---

<sup>11</sup>Using only small or only large firms in the control group leads to similar (though less precise results)

Turning to on-the-job training, we observe a relative increase of the training incidence for medium sized workplaces (+12.3%) compared to small-sized (+1%) and big-sized workplaces (+2.7%). This increase nearly matches the decrease in classroom training incidence (-13.3%). Overall, these movements are coherent with the hypothesis that medium-sized workplaces in Quebec substituted classroom to on-the-job training following the change in Bill 90.

**5.2. Training intensity.** This preliminary conclusion is not changed when we turn to training intensities in Table 2. The average proportion of employees receiving classroom training in medium-sized workplaces decreased by 11.6 percentage points or 33.4% between 2003 and 2005 while the intensity of on-the-job training increased by 7 percentage points or 19.1%.

Compared to Ontario, we observe a relative decline in the intensity of classroom training of medium-sized workplaces compared to smaller firms but a decrease compared to bigger firms. Moreover, for on-the-job training, we observe a relative decline in the intensity of on-the-job training for medium sized workplaces. Overall, the raw data on training intensities are even more suggestive of a substitution by medium-sized firms in Quebec away from classroom training and towards on-the-job training.

In the following section, we tackle the question of whether these movements are statistically significant and whether they are robust to the inclusion of other determinants of training. Note that because the variable indicating the proportion of workers receiving training is a more precise measure of the training levels within the firm, we use that specific variable in the regression analysis that follows.

## 6. REGRESSION ANALYSIS OF TRAINING INTENSITIES

**6.1. Double-differences estimates.** In order to test whether the movements outlined above are statistically different from zero, and to take into account some other observable differences between our treatment and control groups, we first use estimate a double-differences model in which the change in training intensities for medium-sized workplaces before and after the repeal of the law is contrasted to the change in a comparison group that includes both smaller and larger workplaces.

Formally, let  $P_{jpt}^k$  be the proportion of worker in workplace  $j$  at time  $t$  who received either classroom training ( $k = c$ ) or on-the-job training ( $k = o$ ). We estimate the



following regression model for  $P_{jt}^k$  on the sample of workplaces from Quebec:

$$\begin{aligned} P_{jt}^k &= \beta_0 + \beta_1 D_{jt}^{YEAR=2001} + \beta_2 D_{jt}^{YEAR=2003} + \beta_3 D_{jt}^{YEAR=2005} \\ &+ \gamma_1 D_{jt}^{SIZE=MEDIUM} + \gamma_2 D_{jt}^{SIZE=LARGE} \\ &+ \tau (D_{jt}^{YEAR=2005} \cdot D_{jt}^{SIZE=MEDIUM}) + \epsilon_{jt} \end{aligned}$$

in which  $D^{YEAR=2001}$ ,  $D^{YEAR=2003}$  and  $D^{YEAR=2005}$  are dummy variables equal to one if  $t$  is 2001, 2003 and 2005 respectively (1999 is the omitted year),  $D^{SIZE=MEDIUM}$  and  $D^{SIZE=LARGE}$  are dummy variables for medium and large workplaces respectively (small workplaces are the omitted category).  $\tau$  represents the effect of interest and is interpreted as the impact of the reform on training intensities.

We use data from the sampling years, i.e. 1999, 2001, 2003 and 2005. This means there are 3 pre-repeal periods (1999, 2001 and 2003) and 1 post-repeal periods (2005). This raises the possibility that standard errors could be biased downward (see Bertrand, Duflo, and Mullainathan (2004)). Standard errors for all of our coefficient estimates are bootstrapped in order to fully account for the stratified sampling procedure used by Statistics Canada. This is also recommended by Donald and Lang (2007) to control for residual clustering at the unit of observation level. Statistical significance is based on the bootstrapped confidence interval.

Results are presented in Table 3. The dependent variable is the classroom training intensity in the first four columns and on-the-job training intensity in the last four columns. Coefficients for year dummy variables are not statistically different from zero while coefficient for workplace size indicator variables provides the usual results that larger workplaces provide both more classroom and on-the-job training than smaller workplaces (see for example Barron, Black, and Loewenstein (1987)), maybe because of lesser credit constraints.

Turning to the estimate of the impact of the reform, we find a significant decline in classroom training intensities for medium-sized workplaces following the repeal of the obligation to spend at least 1% of their payroll on training. One interpretation is that Bill 90 was successful in raising training levels. Moreover, coefficient estimates for on-the-job training (though not statistically different from zero) indicate that intensities of on-the-job training moved in the opposite direction, meaning the the total training effort by workplaces did not fall as much as initially thought.

Taken at face value, these results indicate that train-or-pay schemes seem somewhat effective at raising training levels but that a correct assessment of their effectiveness

must carefully take into account the possibility that workplaces are substituting other forms of training for the specific type of training required by the law.

One reason to doubt this conclusion is the possibility of time-varying shocks in the error term our estimated equation that affect workplaces of different sizes differently. In fact, differential trends in training intensities can be inferred from the summary statistics provided in Table 2 but are more easily seen in Figures 1 and 2. In particular, intensities for both classroom and on-the-job training seem to vary more over time for small workplaces than for medium and large workplaces.<sup>12</sup>

**6.2. Triple-difference estimates.** To account for the possible impact of time-varying shocks affecting training intensities differently depending on workplace size, we estimate a triple-difference model, using workplaces in the province of Ontario as an additional control group. The province of Ontario is a neighboring province most similar to Quebec in terms of industrial structure, and is thus the most credible candidate for such an exercise.

Formally, now let  $P_{jpt}^k$  be the proportion of worker in workplace  $j$  in province  $p$  at time  $t$  who received either classroom training ( $k = c$ ) or on-the-job training ( $k = o$ ). We estimate the following regression model for  $P_{jpt}^k$  on a sample of workplaces from Quebec and Ontario:

$$\begin{aligned} P_{jpt}^k &= \delta ONT_{jpt} + \beta YEAR_{jpt} + \gamma SIZE_{jpt} + \\ &+ \theta_1 QC_{jpt} \cdot REF_{jpt} + \theta_2 REF_{jpt} \cdot MED_{jpt} + \theta_3 QC_{jpt} \cdot MED_{jpt} + \\ &+ \tau QC_{jpt} \cdot REF_{jpt} \cdot MED_{jpt} \end{aligned}$$

in which  $ONT_{jpt}$  is a dummy variable equal to one if  $p$  is Ontario,  $YEAR_{jpt}$  is a vector of year dummies from  $t = 2001, 2003$  and  $2005$  (1999 is the omitted category),  $SIZE_{jpt}$  is a vector of workplace size dummies in which we distinguish three categories (small (omitted), medium and big),  $QC_{jpt}$  is a dummy variable equal to one if  $p$  is Quebec,  $REF_{jpt}$  is a dummy variable equal to one for the post-reform years ( $t = 2005$ ), and finally  $MED_{jpt}$  is a dummy variable equal to one for medium-sized workplaces.  $\tau$  represents the effect of interest and is interpreted as the impact of the reform on training intensities.

Coefficients estimates are presented in Table 4. It shows similar results for variables included in the double-differences model. However, coefficients benefit for the bigger

<sup>12</sup>Interestingly, Figure 1 clearly shows that drop in the intensity of classroom training after the reform while Figure 2 raises the possibility that workplaces already started making adjustments in 2003 in anticipation of a possible change in the legislation (that was announced in June 2003).

sample size and are estimated more precisely. If there is constant difference in training levels between Quebec and Ontario, it is shown in significantly higher levels of on-the-job training in Ontario.

Our triple difference estimates are presented near the bottom of the table. The estimate in column 4 indicates that classroom training intensities drops 7.1 probability points, a drop similar to the the estimated  $-9.9$  estimated previously. However, on-the-job training intensities increases by 10.9 probability points. In both cases, changes are statistically different from zero, indicating that repeal instigated a decrease in classroom training, accompanied by a compensating increase in on-the-job training.

## 7. CONCLUSION

On January 1st 2004, the Quebec government abolished a law which had required that firms with total sales between \$250,000 and \$1,000,000 use 1% of their total revenue for training purposes. In this paper, we use this change in the law as a natural experiment to investigate whether the training levy was effective in raising training levels in Quebec. We thus adds to the very short literature evaluating the impact of governmental programs designed to increase levels of firm-sponsored training.

We find that after the application of a train-or-pay scheme was suspended for medium-sized workplaces, they started doing less classroom training (the type mandated by the law) and more on-the-job training. These results indicate that a correct assessment of the effectiveness of train-or-pay schemes must carefully take into account the possibility that workplaces are substituting other forms of training for the specific type of training required by the law. We conclude that the train-or-pay scheme in Quebec did not successfully raise firm-sponsored training levels.

## REFERENCES

- Abowd, J. M. and F. Kramarz (1999). The analysis of labor markets using matched employer-employee data. In O. Ashenfelter and D. Card (Eds.), *Handbook of Labor Economics, vol 3B*, Chapter 40, pp. 2629–2710. Elsevier Science North Holland.
- Abramovsky, L., E. Battistin, E. Fitzsimons, A. Goodman, and H. Simpson (2011, 01). Providing employers with incentives to train low-skilledworkers: Evidence from the uk employer training pilots. *Journal of Labor Economics* 29(1), 153–193.
- Acemoglu, D. and S. Pischke (1999). Beyond Becker: Training in imperfect labor markets. *The Economic Journal* 119, F112–F142.

- Almeida, R. and R. Aterido (2008, October). The incentives to invest in job training : do strict labor codes influence this decision? *Social Protection Discussion Papers* (46189).
- Barron, J. M., D. A. Black, and M. A. Loewenstein (1987). Employer size: The implications for search, training, capital investments, starting wages, and wage growth. *Journal of Labor Economics* 7(1), 1–19.
- Bassanini, A., A. L. Booth, G. Brunello, M. D. Paola, and E. Leuven (2007). Workplace training in europe. In *Education and Training in Europe*. Oxford University Press.
- Becker, G. S. (1964). *Human Capital. A Theoretical and Empirical Analysis with Special Reference to Education*. Cambridge: National Bureau of Economic Research.
- Bertrand, M., E. Duflo, and S. Mullainathan (2004). How much should we trust differences-in-differences estimates? *The Quarterly Journal of Economics* 119(1), 249–275.
- Conseil du Patronat du Québec (2006). *Mémoire du Conseil du Patronat du Québec soumis à la Commission de l'économie du travail*. Conseil du Patronat du Québec.
- Direction du Fonds national de formation de la main-d'oeuvre (2005). *Bilan quantitatif sur la participation des employeurs à la Loi favorisant le développement de la formation de la main-d'oeuvre en vertu de l'article 3*. Emploi Québec.
- Donald, S. G. and K. Lang (2007). Inference with difference-in-differences and other panel data. *The Review of Economics and Statistics* 89(2), 221–233.
- Emploi Québec (2000). *Loi favorisant le développement de la main-d'oeuvre. Rapport quinquennal sur la mise en oeuvre 1995-2000*. Gouvernement du Québec.
- Emploi Québec (2005). *Loi favorisant le développement de la main-d'oeuvre. Rapport quinquennal 2000-2005*. Gouvernement du Québec.
- Gouvernement du Québec (1998). *Guide Général. Édition 1998 révisée. Loi favorisant le développement de la main-d'oeuvre*. Gouvernement du Québec.
- Haroun, T. (2005, Saturday November 19th). Formation continue. développement de la formation de la main-d'oeuvre. le patronat demande l'abolition de la loi du 1%. *Le Devoir*, c9.
- Katz, E. and A. Ziderman (1990). Investment in general training: The role of information and labour mobility. *The Economic Journal* 100(403), 1147–1158.
- Leuven, E. (2005). The economics of private-sector training: A review of the literature. *Journal of Economic Surveys* 19(1), 91–111.

- Leuven, E. and H. Oosterbeek (2004, April). Evaluating the effect of tax deductions on training. *Journal of Labor Economics* 22(2), 461–488.
- Stevens, M. (1994). A theoretical model of on-the-job with imperfect competition. *Oxford Economic Papers* 46, 537–594.
- Stevens, M. (2001). Should firms be required to pay for vocational training. *The Economic Journal* 111, 485–505.

## APPENDIX A. TABLES

TABLE 1. Summary statistics for training incidence

<i>% offering</i>				<i>% offering</i>			
<b>Québec</b>	<i>classroom training</i>			<b>Ontario</b>	<i>classroom training</i>		
Size	Small	Medium	Large	Size	Small	Medium	Large
1999	20.7	56.7	86.6	1999	23.2	41.1	71.1
2001	16.7	59.3	80.8	2001	17.8	39.9	72.0
2003	17.5	56.5	80.3	2003	17.7	53.0	66.5
2005	18.7	49.0	78.7	2005	25.7	49.0	69.7

<i>% offering</i>				<i>% offering</i>			
<b>Québec</b>	<i>on-the-job training</i>			<b>Ontario</b>	<i>on-the-job training</i>		
Size	Small	Medium	Large	Size	Small	Medium	Large
1999	21.3	71.4	86.3	1999	43.6	59.7	76.7
2001	21.2	63.9	78.3	2001	37.0	52.4	79.2
2003	19.5	58.3	83.4	2003	38.2	64.6	74.1
2005	19.7	65.1	85.7	2005	41.7	64.1	83.3

WES 1999, 2001, 2003 & 2005

TABLE 2. Summary statistics for training intensities

<b>Québec</b>	<i>Average prop. for</i>			<b>Ontario</b>	<i>Average prop. for</i>		
	<i>classroom training</i>				<i>classroom training</i>		
Size	Small	Medium	Large	Size	Small	Medium	Large
1999	13.6	32.4	46.5	1999	16.1	23.9	37.1
2001	9.4	32.7	56.0	2001	16.8	25.0	37.4
2003	12.0	34.7	46.0	2003	12.1	32.8	39.7
2005	12.2	23.1	42.5	2005	17.6	30.2	33.2

<b>Québec</b>	<i>Average prop. for</i>			<b>Ontario</b>	<i>Average prop. for</i>		
	<i>on-the-job training</i>				<i>on-the-job training</i>		
Size	Small	Medium	Large	Size	Small	Medium	Large
1999	12.1	35.5	43.7	1999	33.1	32.4	40.5
2001	12.3	27.1	41.9	2001	33.5	34.0	47.3
2003	11.3	36.7	38.1	2003	30.9	42.5	36.9
2005	13.1	43.7	42.1	2005	36.2	39.2	48.2

WES 1999, 2001, 2003 & 2005



TABLE 3. Double-differences regression results

Dependent variable:	Average proportion of employees receiving classroom training				Average proportion of employees receiving on-the-job training			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Year indicators</i>								
Year=1999		-	-	-		-	-	-
Year=2001		-0.018 (0.030)	-0.023 (0.028)	-0.024 (0.028)		-0.011 (0.024)	-0.016 (0.023)	-0.016 (0.023)
Year=2003		0.008 (0.029)	-0.007 (0.027)	-0.008 (0.027)		-0.001 (0.027)	-0.016 (0.025)	-0.015 (0.025)
Year=2005		-0.013 (0.032)	-0.036 (0.031)	-0.014 (0.036)		0.031 (0.029)	0.010 (0.026)	0.002 (0.031)
<i>Workplace size indicators</i>								
Small			-	-			-	-
Medium			0.190*** (0.024)	0.215*** (0.028)			0.207*** (0.023)	0.198*** (0.027)
Large			0.357*** (0.029)	0.355*** (0.029)			0.290*** (0.021)	0.291*** (0.022)
<i>Treatment indicator</i>								
MED * Year=2005				-0.099** (0.049)				0.037 (0.060)
Constant	0.187*** (0.011)	0.193*** (0.022)	0.134*** (0.024)	0.129*** (0.024)	0.190*** (0.010)	0.185*** (0.016)	0.128*** (0.015)	0.129*** (0.015)
#OBS	5088	5088	5088	5088	5088	5088	5088	5088
R-squared	0.00	0.00	0.07	0.07	0.00	0.00	0.08	0.08

WES 1999, 2001, 2003 & 2005

Bootstrapped standard errors in parentheses: \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

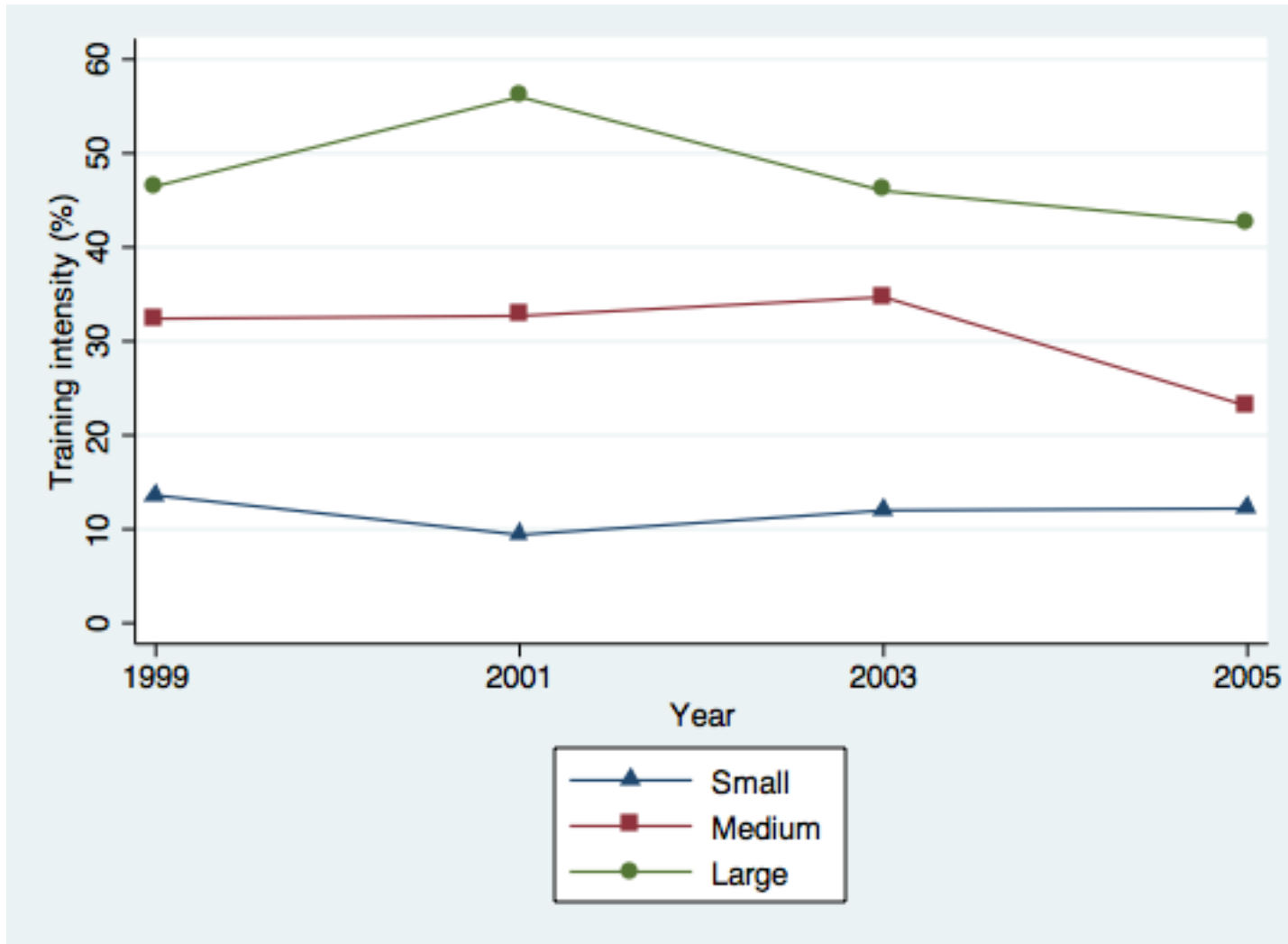


FIGURE 1. Average intensity of classroom training by workplace size. Source: WES 1999, 2001, 2003 and 2005

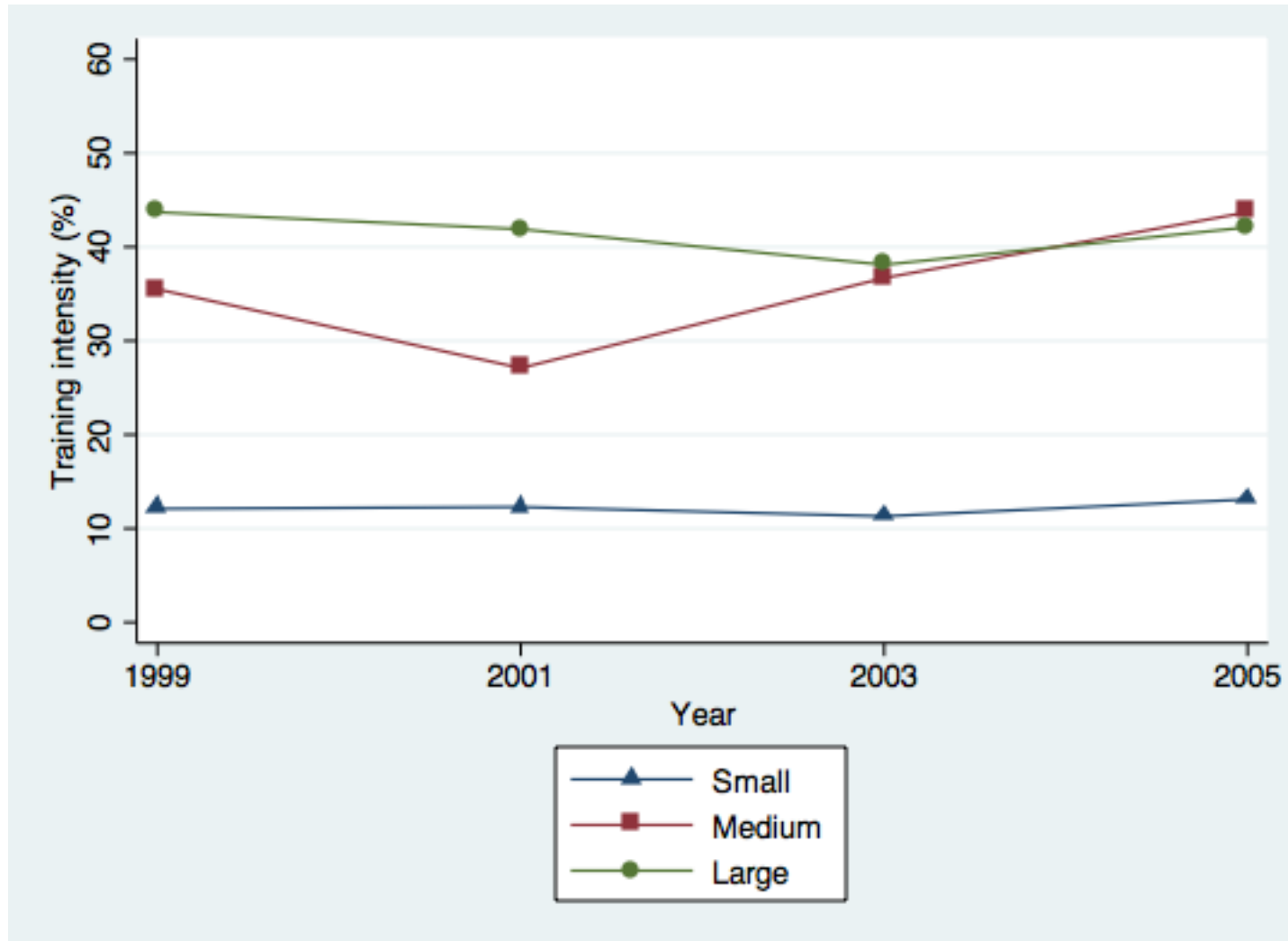


FIGURE 2. Average intensity of on-the-job training by workplace size. Source: WES 1999, 2001, 2003 and 2005

TABLE 4. Triple-differences regression results

Dependent variable:	Average proportion of employees receiving classroom training				Average proportion of employees receiving on-the-job training			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Province indicators</i>								
Ontario	0.019 (0.017)	0.019 (0.017)	0.010 (0.017)	0.006 (0.018)	0.163*** (0.018)	0.163*** (0.018)	0.157*** (0.018)	0.163*** (0.019)
<i>Year indicators</i>								
Year=1999		-	-	-		-	-	-
Year=2001		0.002 (0.027)	-0.006 (0.026)	-0.006 (0.026)		0.004 (0.029)	-0.001 (0.029)	-0.001 (0.029)
Year=2003		-0.000 (0.021)	-0.011 (0.021)	-0.011 (0.021)		0.003 (0.029)	-0.004 (0.029)	-0.004 (0.029)
Year=2005		0.020 (0.023)	0.001 (0.022)	0.007 (0.022)		0.042 (0.028)	0.030 (0.028)	0.021 (0.030)
<i>Workplace size indicators</i>								
Small			-	-			-	-
Medium			0.148*** (0.021)	0.155*** (0.022)			0.099*** (0.021)	0.089*** (0.023)
Large			0.252*** (0.020)	0.252*** (0.020)			0.163*** (0.020)	0.164*** (0.020)
<i>Treatment indicator</i>								
MED * QC * Year=2005				-0.071* (0.041)				0.109** (0.054)
Constant	0.187*** (0.011)	0.182*** (0.019)	0.139*** (0.019)	0.140*** (0.019)	0.190*** (0.010)	0.178*** (0.018)	0.150*** (0.018)	0.148*** (0.018)
#OBS	10962	10962	10962	10962	10962	10962	10962	10962
R-squared	0.00	0.00	0.05	0.05	0.02	0.02	0.03	0.03

WES 1999, 2001, 2003 &amp; 2005

Bootstrapped standard errors in parentheses: \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%