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The effect of tax subsidies to employer-provided supplementary health insurance: evidence from Canada

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Abstract

This paper presents new evidence of the effect of the tax subsidy to employer-provided health insurance on coverage by such insurance. I study the effects of a 1993 tax change that reduced the tax subsidy to employer-provided supplementary health insurance in Quebec by almost 60%. Using a differences-in-differences methodology in which changes in Quebec are compared to changes in other provinces not affected by the tax change, I find that this tax change was associated with a decrease of about one-fifth in coverage by employer-provided supplementary health insurance in Quebec. This corresponds to an elasticity of employer coverage with respect to the tax price of about -0.5 . Non-group supplementary health insurance coverage rose slightly in Quebec relative to other provinces in response to the reduction in the tax subsidy to employer-provided (group) coverage. But the increase in the non-group market offset only 10–15% of the decrease in coverage through an employer. The decrease in coverage through an employer was especially pronounced in small firms, where the tax subsidy appears much more critical to the provision of supplementary health insurance than it does in larger firms. © 2002 Elsevier Science B.V. All rights reserved.

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1. Introduction

In both the United States and Canada, private health insurance is primarily

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obtained as an employee benefit. In the United States, almost 90% of the non-elderly with private health insurance are covered through their employer (Employee Benefits Research Institute, 1995). In Canada, almost all private health insurance – which primarily covers out of hospital prescription drugs since these are not covered by the public health insurance system – is provided through an employer.¹ There may be efficiency reasons for the prevalence of such insurance through the workplace. Economies of scale in the administration and underwriting of policies make it cheaper for firms (particularly large ones) to provide benefits. In addition, pooling workers of different health risks can reduce the scope for adverse selection that is present in the market for non-group health insurance.

The predominance of employer provision may also be a function of the tax system. Both Canada and the United States subsidize employer provision of health benefits by excluding employer contributions to these benefits from the employee's taxable income. These tax subsidies constitute major expenditures for their respective governments. In the United States, the tax exclusion of employer-provided health insurance is the largest single tax expenditure, costing the federal government \$US 72.5 billion in foregone federal income tax revenue in fiscal year 1999 (Office of Management and Budget, 1999). In Canada, the exclusion cost the federal government approximately \$CA 1.6 billion in lost federal tax revenues in 1998. (Government of Canada, 1998).²

There is little empirical evidence with which to estimate of the expected effects of a reduction in this tax subsidy on the extent of coverage through the workplace. Most of the existing literature is based on comparing health insurance coverage across workers with different marginal tax rates and hence different tax subsidy rates. As is discussed in greater detail below, such analyses are unlikely to estimate consistently the effect of the tax subsidy on coverage by employer-provided health insurance. However, a recent major reform to the tax subsidy in Canada provides an opportunity to consistently estimate the effect of the tax subsidy on coverage by employer-provided supplementary health insurance. In May 1993, the Quebec government removed the exclusion of employer contributions to health and dental benefits from an employee's provincial taxable income.

¹There do not appear to be any comprehensive statistics on the non-group health insurance market in Canada. However, calculations by the author, based on the annual surveys of the Canadian Health and Life Insurance Association, suggest that less than 3% of individuals with private health insurance in Canada are covered by the non-group market. These data (and their limitations) are discussed in more detail in Section 4.4.

²Both the US and Canadian figures include lost revenue from the tax subsidy provided to medical expenditures above a certain fraction of income. The total loss in revenue from the tax subsidy to employer-provided health insurance is considerably higher once foregone revenues from state (or provincial) and payroll taxes are considered.

The other provinces and the federal government kept the tax exclusion in place. The reform cut the total tax subsidy to employer-provided supplementary health insurance in Quebec by almost 60%. This change in the subsidy is substantially larger than changes studied in previous work. It therefore provides a unique opportunity to consider the effects of large-scale changes in the tax subsidy to employer provided supplementary health insurance.

Although universal public health insurance in Canada makes private health insurance coverage less critical in Canada than in the United States, substantial gaps in the Canadian public system have resulted in widespread use of supplementary private health insurance. In particular, the Canadian public health insurance system, like the US Medicare program for those over 65, does not cover out of hospital prescription drugs. These are a rapidly rising component of health costs in Canada, amounting to 15% of total health expenditures in 1993 (World Health Organization, 1996). As a result of this and other gaps in the public health insurance system, about 80% of the non-elderly, non-indigent adult population in Canada has supplementary health coverage through a private plan (Mercer, 1995).

The effects of tax subsidies to employer-provided supplementary health insurance in Canada have been analyzed previously by Stabile (1999). Stabile explores the effects of marginal tax rates on the propensity to hold employer-provided supplementary health insurance by using variation in marginal tax rates across individuals at a point in time. This paper builds on Stabile's work by exploiting a richer data set that allows us to look across time over the period of the Quebec reform as well as across individuals in estimating the effects of a change in the tax subsidy to employer-provided supplementary health insurance.

The results of this paper indicate that the tax subsidy to employer-provided supplementary health insurance has a large effect both on employer-provided supplementary health insurance coverage and on total insurance coverage. The reduction of the tax subsidy in Quebec coincided with a 13–14 percentage point drop in workplace coverage. This drop constitutes an 18–19% decrease in workplace coverage and corresponds to an elasticity of employer coverage with respect to the tax price of -0.46 to -0.49 . This estimate is robust to alternative specifications. Changes in coverage reflect the joint outcome of changes in employer offering and changes in employee take-up. For reasons discussed below, I believe that the observed response is more likely to be occurring on the offering margin than the take-up margin, although I cannot distinguish empirically between these two effects.

Evidence from the non-group market suggests that non-group supplementary health insurance coverage rose slightly in Quebec relative to other provinces in response to the reduction in the tax subsidy to employer-provided (group) coverage. However, the increase in coverage in the non-group market offset only 10–15% of the decrease in coverage through an employer. The reduction in the tax subsidy to employer-provided supplementary health insurance is therefore associ-

ated with a substantial net decline in total private supplementary health insurance coverage in Quebec.

The evidence presented here also indicates a substantial dispersion across firms of different sizes in the sensitivity of workplace coverage to the tax subsidy. The reform is associated with a 19–26 percentage point reduction in coverage in firms with less than 20 employees, compared to only a 6–7 percentage point reduction in firms with more than 500 employees. These results suggest that the tax subsidy is critical to employer provision of supplementary health insurance in small firms, where gains from pooling and reduced administrative costs are likely to be small if present at all. The tax subsidy appears less critical in larger firms where these other factors may play a larger role in the creation of workplace-based insurance pools.

The rest of the paper proceeds as follows. In Section 2, I provide background on the Canadian public and private health insurance systems and on the tax treatment of employer-provided supplementary health insurance. Section 3 describes the data and estimation strategy.

The results of the tax reform are presented and discussed in section 4. I first present estimates of the effect of the Quebec reform on coverage by employer-provided supplementary health insurance. I compare this estimate to previous estimates of the effect of the tax subsidy on workplace coverage. I then extend the analysis to consider the effect of the Quebec reform on different types of workers and on coverage by employer-provided dental benefits. I also estimate the effects of a smaller tax reform that occurred at the same time in Ontario. Finally, I analyze the effects of the Quebec reform on the non-group market for supplementary health insurance in Quebec.

Section 5 examines the relative role of the tax subsidy – compared to other advantages of the workplace as a source of health insurance provision – in making the workplace the predominant source of such insurance. By comparing the effect of the Quebec reform on workers in firms of different sizes, I conclude that the tax subsidy plays a much larger role in the decision to provide insurance in small firms than in larger ones.

Section 6 presents several tests of the underlying assumption in the paper that the observed changes in supplementary health insurance coverage in Quebec are due to the Quebec tax reform rather than to other factors. Section 7 concludes.

2. Background

2.1. The Canadian health care system

Canada has a predominantly publicly financed health insurance system that provides universal coverage with no user costs for a wide range of physician and

hospital services. Yet significant gaps exist in the national insurance program.³ As a result, private health insurance that supplements the public insurance system is widespread in Canada. The single largest expense not covered by the public system is expenditures on outpatient prescriptions drugs. Other services not covered by the national insurance include semi-private or private hospital accommodation, eyeglass and hearing aid plans, certain medical equipment such as prostheses and wheelchairs, rehabilitation, private nursing care, cosmetic procedures, out-of-country medical and hospital coverage, and dental benefits. Indeed, in 1993, only 73% of Canadian health expenditures were publicly funded. Private spending on health insurance totaled \$CA 19 billion; of this, spending on private insurance amounted to \$CA 6.2 billion, or 8.7% of total health expenditures. In addition, some portion of the \$CA 7.6 billion dollars of out-of-pocket spending was due to cost sharing in supplementary plans. (World Health Organization, 1996).

As discussed previously, private health insurance in Canada is provided predominantly through the workplace. Survey evidence suggests that participation in employer health plans is not usually optional; over half of employer plans require employee participation, sometimes allowing for opt outs only if the individual is already covered as a dependent under a spouse's plan. Often employees will have a choice between individual or family coverage, but there is no indication of other elements of choice. The evidence also suggests that only about a third of plans require employee contributions to health premia, with average contributions of about 40% of premia (Wyatt, 1993). Evidence from the Canadian Health and Life Insurance Association – which reports on total premia and number of policyholders – suggests that premia for group supplementary health insurance in 1993 were around \$CA 300 to \$CA 350 (Canadian Life and Health Insurance Association, 1993).

2.2. The tax subsidy to employer-provided supplementary health insurance in Canada

The corporate income tax treats wages and employer contributions to health insurance plans symmetrically: Both are deductible from the employer's corporate income tax base. However, these two forms of compensation are treated differently by the personal income tax. Unlike wages, employer contributions to health and dental plans in Canada are excluded from an individual's federal income and payroll tax bases. In addition, all provinces except Quebec follow the federal system and exclude employer-provided health and dental benefits from an individual's provincial taxable income. Quebec exempted employer contributions

³ Some provinces choose to cover some of these gaps through provincial public insurance programs.

from the Quebec personal income tax until May 1993, when, in an effort to raise revenue, the Quebec government eliminated the tax exempt status of employer contributions to private health and dental insurance plans.⁴

The exclusion of employer contributions to group health insurance from the personal income tax base provides a subsidy to such insurance. While compensation paid in the form of wages and salary is subject to personal income and payroll taxation, compensation paid in the form of health insurance is not. If the tax code treated employer contributions to group health insurance and employer contributions to wages symmetrically, the price of health insurance in terms of foregone, after-tax consumption would be one. Since, however, employer contributions to group health insurance are exempt from taxable income, this price is less than one.

Following the existing literature, I define the “tax price” of employer-provided health insurance premia as the cost to the employee of a dollar of health insurance premia in terms of foregone, after-tax consumption. To represent this tax price, let τ_{fed} denote the federal marginal income tax rate on the marginal dollar of earned income, τ_{prov} denote the provincial marginal income tax rate, $\tau_{\text{payroll, worker}}$ denote the payroll tax levied on the employee for a marginal dollar of earned income, and $\tau_{\text{payroll, firm}}$ denote the payroll tax levied on the employer for a marginal dollar of earned income. In a competitive labor market, the employer will be indifferent between contributing a dollar to health insurance premia or a dollar to wages. Given the tax-exempt status of health insurance, if the employer contributes a dollar to health insurance premia, the employee receives a dollar in health insurance premia. If the employer contributes a dollar to wages, however, the employee receives only $1/(1 + \tau_{\text{payroll, firm}})$, since the employer must pay payroll taxes on any wages paid to the employee, but not on compensation paid in the form of health insurance.⁵ The employee must, in turn, pay federal and provincial

⁴The Quebec government estimated that, in 1992, the tax exclusion of employer contributions to private health insurance premia cost the Quebec government \$CA 149 million in foregone revenue (Government of Quebec, 1996). The Quebec reform was part of a general pattern at both the provincial and federal level to expand the tax base by levying new taxes on employer-provided insurance plans. At the same time that Quebec removed the tax exemption for employer contributions to private health insurance plans, it also removed the previously existing tax exemption to employer contributions for the first \$CA 25,000 of life insurance. The federal government followed suit in 1994 when it eliminated the federal tax exemption for the first \$CA 25,000 of employer contributions to group life insurance. It has debated, but failed to enact, a reform in the federal budget that would have followed Quebec’s 1993 health insurance tax reform at the federal level. Nor were the 1993 Quebec reforms the first time the Quebec government had expanded its tax base by levying new taxes on employee insurance plans. In 1985, it levied a 9% retail sales tax on group insurance premia and in 1990 it extended the sales tax to cover self-insured employee benefit plans. Ontario followed this example in 1993 when it levied an 8% retail sales tax on insured and self-insured group benefit plans and extended its 2% premium tax, previously levied only on insured group benefit plans, to self-insured plans. (Koskie et al., 1995; Nielson, 1998).

⁵I assume that labor supply is inelastic and therefore the full incidence of income and payroll taxes are borne by the worker.

income taxes and payroll taxes on any wages received, but not on any health insurance premia paid by the employer. Finally, group health insurance faces certain consumption taxes (specifically, premium and sales taxes) that are not applied to other services that the employee could buy.⁶ As a result of these tax rules, the tax price of a dollar of health insurance premia, or the cost of health insurance premia to the employee in terms of foregone, after-tax consumption, is given by the following:⁷

$$\text{TAXPRICE} = \frac{\{(1 + \tau_{\text{cons}}) * (1 - \tau_{\text{fed}} - \tau_{\text{prov}} - \tau_{\text{payroll, worker}})\}}{\{1 + \tau_{\text{payroll, firm}}\}} \quad (1)$$

Since τ_{cons} is empirically small, this tax price is less than 1. The resulting tax subsidy to employer-provided health insurance therefore reduces the price of this insurance for the employee compared to the price of other consumption. I make use of a change in the tax subsidy to study the relationship between the tax price of employer-provided health insurance and the demand for it.

2.3. The 1993 Quebec reform

The 1993 Quebec tax reform made employer contributions to health insurance taxable to the employee under the Quebec provincial income tax. For insured plans, the value of the taxable benefit is assessed as the premium paid by the employer. For self-insured plans, the value of the taxable benefit is the employee's pro-rated share of the plan's benefit payments and administrative expenses incurred with third-party operators (Koskie et al., 1995).

The tax price of employer-provided supplementary health insurance in Quebec after the reform is therefore given by the following:

$$\text{TAXPRICE} = \frac{\{(1 + \tau_{\text{cons}}) * (1 - \tau_{\text{fed}} - \tau_{\text{payroll, worker}})\}}{\{1 + \tau_{\text{payroll, firm}}\}} \quad (2)$$

The reform increased the tax price of employer-provided supplementary health insurance in Quebec by the following:

$$\frac{\{(1 + \tau_{\text{cons}}) * (\tau_{\text{Quebec}})\}}{\{1 + \tau_{\text{payroll, firm}}\}}.$$

Basic provincial marginal tax rates in Quebec range from 16 to 24%.

A tax subsidy to employer-provided supplementary health insurance still remains in Quebec after the reform because of the exclusion of this benefit from federal income and payroll taxes. Absent the Quebec reform, the average

⁶I assume that the incidence of these consumption taxes is on the consumer.

⁷If we were instead to consider the tax price of a dollar of health insurance benefits (rather than a dollar of health insurance premia), Eq. (1) would have to be adjusted to take into account the administrative load (or excess of premia over claims as a percentage of claims) on group health insurance. This would simply represent a scaling of Eq. (1) and would not affect the analysis.

Table 1
Tax rates and tax prices^a

	Quebec		Control provinces	
	1991	1994	1991	1994
Federal marginal tax rate	0.197	0.196	0.227	0.232
Provincial marginal tax rate	0.214	0.235	0.110	0.117
Payroll marginal tax rate (Combined employer plus employee rate)	0.068	0.076	0.068	0.073
Excess consumption tax on group supplementary health insurance relative to other services	0.110	0.1115	0.022	0.022
Tax price of supplementary health insurance	0.597	0.822	0.623	0.607

^a Table reports average tax rate in each cell. All means are weighted. Tax Price is defined by Eq. (1) for all cells except Quebec in 1994 where it is defined by Eq. (2).

employee in Quebec would have faced a choice between a dollar in supplementary health insurance premia or 57 cents of after tax consumption; because of the reform, the choice was between a dollar in supplementary health insurance or 82 cents of after tax consumption. As a result, the reform increased the tax price of supplementary health insurance on average by 25 cents. The tax subsidy fell from 43 cents to 18 cents, or by 58%. The components of the tax subsidy to employer-provided supplementary health insurance in Quebec before and after the tax reform are given in Table 1. For comparison purposes, Table 1 also reports the components of the tax subsidy in the control provinces that are used in the estimation strategy.⁸

3. Data and estimation strategy

3.1. Data source and sample

The analysis in this paper is based primarily on a repeated cross-section formed from the 1991 and 1994 Canadian General Social Surveys (GSS). The GSS is an annual, stratified random telephone survey of the non-institutional population over

⁸ Table 1 indicates that the average tax price in Quebec in 1991 was 60 cents. The difference between this price and the 57 cents that the tax price would have been in 1994 absent the reform is due simply to slight compositional differences between the 1991 and 1994 sample that are controlled for in the analysis.

age 15 in the 10 Canadian provinces. Since the Quebec reform was effective starting in May 1993, I use the 1991 survey for the “before” period and the 1994 survey for the “after” period.⁹ I restrict the sample to individuals aged 25–64 who have paid employment, and exclude the self-employed.¹⁰

3.2. The dependent variable

The dependent variable is a binary variable indicating whether the individual receives supplementary health insurance from his or her employer.¹¹ The variable therefore combines information on employer offering with information on employee take-up, conditional on offering. Changes in this variable, however, are most likely due to changes in employer offering rather than employee take-up. As discussed above, many employees do not have a choice of take-up if the employer offers health benefits, and employers pay the bulk of their employees’ health insurance premia. Both of these features suggest that it is unlikely that changes in coverage reflect changes in take-up.

The decision to offer insurance as a function of the tax subsidy is, at one level, a firm decision. In equilibrium, however, the firm behavior reflects a joint decision, or bargain, between the worker and the firm. Observed changes in firm offering, therefore, likely reflect underlying changes in demand by some group of workers in the firm.

The surveys distinguish between two types of insurance: medical and surgical benefits, and dental benefits.¹² As discussed above, the predominant risk insured by medical and surgical benefit plans is expenditure on out of hospital prescription drugs. Other services not covered by the public insurance system (such as semi-private or private hospital accommodation, private nursing care, or chiropractic) are often covered as well by these private plans (Wyatt, 1993). Private dental benefits include basic treatment, major restorative treatment, and orthodontics.¹³ I

⁹The 1991 survey was the last before the 1993 reform to ask about employer-provided benefits. The 1994 survey is the only GSS survey after the 1993 reform to ask about employer-provided benefits. Both were conducted evenly throughout the 12 months of the year.

¹⁰Both surveys come with weights that are designed to sum to the population of Canada. So that different years are not given different weight in the analysis (due either to population growth or to the selected subsample being a different fraction of the total sample in the different years), I rescale the weights so that, in each year, in the selected subsample, the weights sum to 1.

¹¹The survey questions read: “Does your employer provide you with medical/surgical benefits beyond those provided by your provincial health care system” and “Does your employer provide you with dental care benefits.” The interviewer instructions clarify that “by ‘provide’ we mean that the employer subsidizes or pays for all or part of the items listed.”

¹²Dental benefits tend to be insured separately in Canada from other potential medical expenditures.

¹³No information is available in the survey about other margins of coverage which may also be affected by the tax subsidy, such as co-pay rates, services covered, or employee contributions to premia. I therefore follow the bulk of the literature in considering just the binary coverage margin.

study separately the effect of the reform on medical and surgical benefits (hereafter, “supplementary health insurance”) and dental benefits.

3.3. Identification strategy: difference-in-differences

The approach taken in this paper is to compare the change in coverage by employer-provided supplementary health insurance between 1991 and 1994 in Quebec to the change in coverage over the same period in a group of 7 control provinces that are not affected by the Quebec tax reform.¹⁴ Ontario is excluded from the control provinces because in 1993 – at the same time that Quebec removed its provincial income tax subsidy to employer-provided supplementary health insurance – Ontario imposed an 8% provincial retail sales tax on employer-provided supplementary health insurance and extended its existing 2% premium tax for insured employer health plans to self-insured employer plans. I also exclude Saskatchewan because in 1993 it altered in the generosity of its provincial public drug insurance program which provides some prescription drug insurance to all residents of the province.

The basic estimating equation is:

$$\begin{aligned} \text{INSURANCE} = & \beta_0 + \beta_1(\text{QUEBEC} \times \text{AFTER}) + \beta_2\text{QUEBEC} \\ & + \beta_3\text{AFTER} + \text{X}\beta_4 + \varepsilon \end{aligned} \quad (3)$$

The dependent variable *INSURANCE* is a binary measure of whether the individual has employer-provided supplementary health insurance. *QUEBEC* is a dummy variable that equals 1 if the individual resides in Quebec, and 0 if he resides in the control provinces. *AFTER* is a dummy variable equal to 1 if the individual was surveyed in 1994, and 0 if he was surveyed in 1991. *QUEBEC* × *AFTER* is an interaction of these two dummies. *X* is a matrix of covariates.

QUEBEC controls for any fixed, regional differences in coverage rates for employer-provided supplementary health insurance. *AFTER* controls for any nationwide trend in employer-provided supplementary health insurance coverage between 1991 and 1994. With these controls in place, β_1 – the parameter of interest – measures the change in the probability of having employer-provided supplementary health insurance in Quebec between 1991 and 1994 relative to the change in the probability of having employer-provided supplementary health insurance in the control provinces between 1991 and 1994. The identifying assumption is that there was no Quebec-specific time trend in coverage between 1991 and 1994 that would have caused trends in coverage to differ between the two regions if the 1993 Quebec tax reform had not been enacted.

¹⁴The seven control provinces are: Alberta, British Columbia, Manitoba, New Brunswick, Newfoundland, Nova Scotia, and Prince Edward Island. The population of Quebec is about three-quarters of the combined population of the seven control provinces.

Compositional changes in the treatment group relative to the control group in characteristics that are correlated with coverage by employer-provided supplementary health insurance could drive differences in trends in coverage between the treatment and control group over the sample period. For example, if union membership decreases in Quebec relative to the control provinces, and union members are more likely to be covered by employer-provided supplementary health insurance than non-union members, this change in union membership could drive differences in the trends in insurance coverage in the two regions. I therefore control flexibly for this possibility by including the X matrix of covariates in Eq. (3). These covariates consist of dummies for union membership, marital status, gender, spousal employment (conditional on marriage), age, educational attainment, number of children under 25, self-reported health status, full time versus part time work, full year versus part year work, personal income, and occupation.¹⁵ I also include the provincial unemployment rate as a covariate to control for any differences in the macroeconomic cycle across provinces.¹⁶

I would like to control for firm size – since there is a well-known positive correlation between firm size and coverage by employer-provided health insurance – but the 1991 data do not include information on firm size. Since data on firm size are available in the 1989 GSS, I estimated the effect of the reform using the 1989 and 1994 samples with and without controlling for firm size. The inclusion or exclusion of controls for firm size had no effect on the estimated effect of the reform using the 1989 and 1994 samples. This suggests that my results from the 1991 to 1994 comparison are unlikely to be affected by the exclusion of firm size controls.

With the covariates included in the regression, the identifying assumption is that, conditional on X, there is no Quebec-specific time trend in coverage by employer-provided supplementary health insurance. I explore several ways of examining the validity of this identifying assumption below. I examine whether coverage by employer-provided supplementary health insurance in Quebec in years prior to the reform is following the same time trend as coverage by this insurance in the control provinces. I also examine whether coverage rates for other employee benefits that are not affected by the Quebec tax reform (such as pensions) are following the same trend in Quebec and in the control provinces between 1991 and 1994.

In the analysis below, I report results from three different specifications of Eq. (3). In the “difference-in-differences” specification, I do not control for any covariates. This regression therefore includes a Quebec fixed effect, a time fixed effect, and the key variable of interest, the interaction of the Quebec and time fixed effect: $QUEBEC \times AFTER$.

¹⁵I have not controlled for industry because of differences in industry categories in the 1991 and 1994 surveys.

¹⁶Provincial unemployment rates are calculated from Statistics Canada, 1997.

I also report the results from two different specifications with covariates. There is a concern that some of the covariates included in X may be jointly determined with coverage by employer-provided supplementary health insurance. For example, there is a well-known correlation between income and benefits, with “good jobs” offering higher pay and better benefits. If individuals have characteristics unobservable to the econometrician that determine whether they are in good jobs or not, then income and benefits are jointly determined. Similarly, individuals who desire supplementary health insurance may choose to work in occupations that are more likely to offer such insurance, or to choose to work full time rather than part time in order to be eligible for benefits.

It is unclear how to address this endogeneity problem given the available data. Lacking instruments for all of the potentially endogenous variables, I try estimating two different specifications of Eq. (3). In the “limited covariates” specification, I include only the most plausibly exogenous covariates: union membership, age, marital status, gender, spousal employment, number of children under 25, educational attainment, and provincial unemployment rates. In the “full covariates” specification, I add to these covariates the potentially endogenous covariates: occupation, income, full time versus part time, full year versus part year, and health status.

I estimate Eq. (3) using ordinary least squares. Non-linear estimation techniques such as probit yield similar results. In all regressions, standard errors are adjusted for heteroscedasticity and, when provincial unemployment is included as a covariate, for province \times year correlation in the error term.

3.4. Comparison to other empirical approaches

Much of the previous literature on the relationship between tax subsidies to employer-provided health insurance and coverage by such insurance has been plagued by problems of identification.¹⁷ Time series studies have compared coverage by health insurance across points in time in which the price of health insurance differs.¹⁸ Such studies suffer from the concern that other things – such as the cost of health care – may have been changing over the time period studied and these things would have an independent effect on coverage rates. Cross-sectional studies have compared health insurance coverage at a point in time across individuals who face different tax subsidies for health insurance.¹⁹ After control-

¹⁷For a more detailed review of the literature on the price responsiveness of employer-provided health insurance, see Gruber (1999).

¹⁸Examples of such studies include Long and Scott (1982) and Turner (1987).

¹⁹Examples of such studies include Phelps (1973), Goldstein and Pauly (1976); Taylor and Wilensky (1983); Woodberry (1983); Holmer (1984); Sloan and Adamche (1986); Leibowitz and Chernen (1992) and Gentry and Peress (1994). These studies all use US data. Stabile (1999) performs a cross-sectional analysis on Canadian data.

ling for income and family structure, the variation in the tax subsidy across individuals is driven predominantly by non-linearities in the treatment of income and family structure by the tax system. For the estimated effect of the tax subsidy to have a causal interpretation requires that the effects of income and family structure on health insurance demand have been fully captured by the controls; otherwise, their effect “loads on” to the estimated effect of the tax subsidy.

The difference-in-differences approach employed here overcomes many of the identification problems of the time series and cross-sectional literature. By comparing changes in Quebec to changes in the control provinces, it controls for any time trend that is common to Quebec and the control provinces in the demand or supply of employer-provided supplementary health insurance. It also controls for any fixed regional differences across provinces in coverage by employer-provided supplementary health insurance.

This difference-in-differences approach has been used previously by Gruber and Poterba (1994) to study the effect of the tax subsidy on health insurance coverage. They study the effect of the creation of a tax subsidy in the United States for health insurance purchased by the self-employed on the probability that a self-employed individual has health insurance. Their estimate of the effect of the tax subsidy is based on a comparison of the change in health insurance coverage for the self-employed before and after the creation of the tax subsidy to the change in coverage for the employed, who were not affected by the new tax subsidy. The primary drawback to this study is that it studies only the self-employed. The self-employed tend to differ from the employed in identifiable ways and may therefore have a different elasticity of demand for health insurance.²⁰ Moreover, the self-employed are able to tailor their health insurance package to their personal preferences. In contrast, employer-provided health insurance has aspects of a local public good in that the employer cannot offer separate health insurance packages to each individual (Goldstein and Pauly, 1976). As a result, the effect of a tax subsidy may be different in an employment context, in which some collective decision rule is used to decide on the benefits package(s) offered, than for an individual who can choose his own package.

4. Results

4.1. Basic results: Changes in coverage by employer-provided supplementary health insurance in Quebec

Table 2 presents sample means for characteristics of the treatment and control groups before and after the 1993 reform. There are some pre-treatment differences

²⁰For example, they tend to be older, more educated and more likely to be male and non-black (Gruber and Poterba, 1994). They may also be less risk averse than those in paid employment.

Table 2
Weighted means of covariates: Quebec vs. control provinces^a

	1991		1994		Difference in differences
	Control provinces	Quebec	Control provinces	Quebec	
Union member	0.365 (0.482)	0.439 (0.497)	0.353 (0.478)	0.447 (0.498)	0.020 (0.032)
Married	0.761 (0.427)	0.743 (0.437)	0.745 (0.436)	0.774 (0.419)	0.046* (0.026)
Male	0.538 (0.499)	0.577 (0.494)	0.548 (0.498)	0.558 (0.497)	-0.029 (0.032)
Spouse employed (among married)	0.731 (0.444)	0.750 (0.434)	0.726 (0.446)	0.720 (0.450)	-0.024 (0.036)
Employed full year	0.811 (0.392)	0.821 (0.384)	0.808 (0.394)	0.856 (0.351)	0.038 (0.024)
Employed full time	0.891 (0.311)	0.911 (0.285)	0.891 (0.312)	0.893 (0.309)	-0.017 (0.019)
<i>EDUCATION</i>					
Less than high school	0.199 (0.399)	0.277 (0.448)	0.159 (0.366)	0.222 (0.416)	-0.016 (0.028)
High school diploma	0.151 (0.359)	0.166 (0.373)	0.191 (0.393)	0.194 (0.396)	-0.012 (0.025)
Some College or Postsecondary schooling	0.465 (0.499)	0.349 (0.477)	0.418 (0.493)	0.329 (0.470)	0.027 (0.031)
(4 yr) College Degree of higher	0.185 (0.389)	0.207 (0.405)	0.232 (0.422)	0.255 (0.436)	0.001 (0.027)
<i>HEALTH</i>					
Excellent health	0.270 (0.444)	0.286 (0.452)	0.292 (0.455)	0.382 (0.486)	0.074*** (0.030)
Very good health	0.376 (0.485)	0.338 (0.473)	0.375 (0.484)	0.305 (0.461)	-0.032 (0.031)
Good Health	0.285 (0.452)	0.280 (0.449)	0.266 (0.442)	0.223 (0.416)	-0.038 (0.029)
Fair health	0.057 (0.233)	0.078 (0.269)	0.058 (0.234)	0.067 (0.250)	-0.013 (0.016)
Poor health	0.012 (0.107)	0.018 (0.134)	0.009 (0.095)	0.023 (0.151)	0.008 (0.009)
Number of Observations (unweighted count)	2,066	827	2,259	834	

^a Notes: All means are weighted. Standard deviations are in parentheses in the first 4 columns. Standard errors are in parentheses in the difference-in-differences column, which compares means in Quebec before and after the reform to means in the control provinces before and after the reform. Standard errors come from regressing the characteristics on year and region trends and an interaction term, and are adjusted for heteroscedasticity.

*** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

between Quebec and the control provinces. In particular, the unionization rate is statistically significantly higher in Quebec, and patterns of educational attainment differ, with more people in Quebec having less than a high school degree and fewer having received some college education. The last column of Table 2 looks at whether differences between Quebec and the control provinces are stable over time. For the most part they are, which allays concerns that the two regions might have been moving on different underlying trends over the sample period. One exception is that there appears to be an increase in the number of people who report their health status compared to others in their age group as excellent in Quebec relative to the control provinces. There is also some evidence of an increase in the percentage of people who are married in Quebec relative to the control provinces. I can control for marital and health status in the analysis below, to control for any effect these changes might have on the demand for employer-provided supplementary health insurance.

Table 3 presents the basic difference-in-differences result. Between 1991 and 1994, coverage by employer-provided supplementary health insurance fell by 8.0 percentage points in Quebec. During the same period, coverage rose by 5.2 percentage points in the control provinces. The difference in these differences indicates a 13.2 percentage point decrease in coverage by employer-provided supplementary health insurance in Quebec relative to the control provinces between 1991 and 1994.

Table 4 presents the results in a regression context. The first column reports the same analysis as in Table 3. Columns 2 and 3 report the effect of adding various covariates to the analysis in the first column. The estimated magnitude of the effect of the reform is not sensitive to the addition of covariates: Depending on the specification, the Quebec reform is associated with a 13.1–13.6 percentage point drop in coverage by employer-provided supplementary health insurance in Quebec

Table 3
Difference in differences: probability of coverage by employer-provided supplementary health insurance: Quebec vs. control provinces^a

	Quebec	Control provinces	Difference
1991	0.723	0.641	0.082 (0.021)
1994	0.644	0.693	-0.050 (0.022)
Difference	-0.080 (0.025)	0.052 (0.017)	-0.132 (0.030)

^a Note: All means are weighted. Heteroscedasticity-adjusted standard errors are in parentheses.

Table 4
 Difference-in-differences: probability of coverage by employer-provided supplementary health insurance: Quebec vs. control provinces^a

	(1) Difference-in- differences	(2) Limited covariates specification	(3) Full covariates specification
Quebec×After	−0.132*** (0.030)	−0.131*** (0.026)	−0.136*** (0.020)
Quebec	0.082*** (0.021)	0.076*** (0.022)	0.038* (0.019)
After	0.052*** (0.017)	0.048* (0.025)	0.020 (0.020)
Union member		0.296*** (0.019)	0.220*** (0.014)
Prov. unemployment rate		−0.008*** (0.002)	0.001 (0.003)
Age 35–44		0.039*** (0.009)	−0.018 (0.011)
Age 45–54		0.021 (0.013)	−0.048*** (0.014)
Age 55–64		−0.029*** (0.010)	−0.075*** (0.017)
Male		0.095*** (0.018)	−0.053*** (0.017)
Married		0.073** (0.030)	0.022 (0.028)
High school diploma		0.111*** (0.020)	0.005 (0.019)
Some college or post- secondary schooling (4 year) college degree or higher		0.134*** (0.012)	−0.003 (0.016)
Spouse employed		0.218*** (0.012)	−0.014 (0.011)
1 Child under 25		−0.022 (0.019)	0.001 (0.016)
2 Children under 25		−0.031 (0.026)	−0.023 (0.021)
3+ Children under 25		−0.016 (0.026)	−0.008 (0.021)
Excellent health		−0.032 (0.034)	−0.017 (0.027)
Very good health			−0.007 (0.016)
Fair health			−0.004 (0.015)
Poor health			0.015 (0.035)
Full time			0.059 (0.046)
Full year			0.139*** (0.037)
Occupation dummies			0.151*** (0.010)
Pers. Inc. bracket dummies			Yes Yes
Constant	0.641*** (0.012)	0.407*** (0.035)	0.109 (0.071)
R ²	0.005	0.146	0.343
N	5986	5850	5377
Mean of dependent variable	0.667	0.668	0.675

^a Notes: Coefficients are from estimates of Eq. (3). Standard errors are in parentheses. They are adjusted for heteroscedasticity and in columns (2) and (3) are also adjusted for province×year correlation in the error term. Regressions are weighted. Omitted age category is age 25–34. Omitted education category is less than high school. Omitted children category is no children under 25. Omitted health category is “good health.” There are 34 occupation dummies and 9 personal income bracket dummies.

*** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

relative to the control provinces.²¹ This effect is statistically significant at the 1% level in all specifications. Given the baseline of 72.3% coverage in Quebec in 1991, these percentage point drops represent an 18–19% decrease in coverage by employer-provided supplementary health insurance in Quebec.

With the richest set of controls, there is no significant change between 1991 and 1994 in coverage by employer-provided supplementary health insurance in the control provinces. Furthermore, while the probability of coverage by employer-provided supplementary health insurance in Quebec is about 4 percentage points higher than in the control provinces prior to the reform, this difference is significant only at the 10% level. Part of this difference may be due to variations across provinces in their provincial public insurance programs. For example, Manitoba and British Columbia have public drug programs that provide all residents with some insurance for prescription drugs, albeit with considerable co-payments and deductibles.²² The lower tax price of supplementary health insurance in 1991 in Quebec compared to the control provinces (see Table 1), may also help account for the higher rate of pre-reform coverage in Quebec. As long as the non-tax factors contributing to the higher coverage rate in Quebec relative to the control provinces in 1991 were not changing between 1991 and 1994, they do not present a problem for this analysis.

To check the sensitivity of these results to the use of the linear probability model, I re-estimated the effect of the Quebec reform using the non-linear probit model. In results not reported here, I find that, with the values of the covariates set to their 1991 (pre-reform) Quebec means, the probit model estimates a 13.4–17.6 percentage point decrease in coverage in Quebec. These estimates are of slightly larger magnitudes than the estimated 13.1–13.6 percentage point decrease from the linear probability model. As in the linear model, the estimated effects of the reform from the probit model are all statistically significant at the 1% level.

4.2. Estimated elasticity and comparison to previous estimates

As discussed above, many papers have examined the relationship between tax subsidies and coverage by employer health insurance. The ones that are most directly comparable to the estimate here are those that look at the relationship between the tax subsidy and the probability that the employer offers health insurance. Of course, my coverage measure potentially combines changes in offering with changes in take-up conditional on offering. However, as discussed

²¹In results not reported here, the estimated effect of the reform is also robust to including interactions of the covariates (X) with AFTER in the regression. This specification allows the effect of covariates (such as union membership) on coverage by employer-provided supplementary health insurance to vary over time.

²²The estimated effect of the Quebec reform is not sensitive, in either magnitude or significance, to the exclusion of these two provinces from the group of control provinces.

above, I believe that the observed changes are most plausibly occurring on the offering margin.

Gentry and Peress (1994) use variation in US state tax rates to identify the effect of the tax subsidy on the percentage of blue collar workers in a city that are offered health insurance. They estimate an elasticity of employer offering with respect to the tax rate of -1.8 for blue collar workers; they find little evidence of an effect for white collar workers. Royalty (1999) also uses cross-state variation in US state income tax rates to estimate the effect of the tax subsidy on employer-provided health insurance. She controls for state fixed effects by comparing the effect of variation in state tax rates on employer offering of health insurance with the effect of this variation on employer offering of sick leave, which does not enjoy the tax advantages of health insurance. She estimates an elasticity of employer offering with respect to the marginal tax rate of -0.68 . Finally, Gruber and Lettau (2000) use variations in the tax price of health insurance from across US states at a point in time as well as over time to estimate an elasticity of employer offering with respect to the tax price of -0.32 .

To compare my estimate to these, I translate the percentage point drop in the probability of coverage by employer-provided supplementary health insurance associated with the Quebec reform into an elasticity of employer coverage of supplementary health insurance with respect to the tax price. There is some arbitrariness in reporting elasticities of coverage with respect to the tax price, as opposed to elasticities with respect to the overall price, or load, to which the tax subsidy contributes. I use the tax price rather than the overall price since the former is the metric used by the literature and therefore provides a better way of comparing my results to those of the previous literature.

I use the Quebec reform, and the associated change in the tax price in Quebec, to estimate the magnitude of the decrease in coverage associated with a given increase in the tax price. I therefore regress coverage by employer-provided supplementary health insurance on the individual's tax price, using the reform (QUEBEC \times AFTER) as an instrument for the tax price.

The basic estimating equation is now:²³

$$\begin{aligned} \text{INSURANCE} = & \beta_0 + \beta_1 \text{TAXPRICE} + \beta_2 \text{PROVINCE} + \beta_3 \text{AFTER} \\ & + X\beta_4 + \varepsilon \end{aligned} \quad (4)$$

TAXPRICE is then instrumented for using QUEBEC \times AFTER. The variation in the individual's tax price used to identify the relationship between the tax price and coverage by workplace-based insurance therefore comes from the Quebec

²³I have controlled for each province separately rather than simply controlling for whether the individual lives in Quebec or not. I do this to control for differences in TAXPRICE that are driven by differences in provincial tax systems. Controlling for each province separately does not alter the estimated effect of the reform in Table 4.

reform. This approach allows me to translate the estimated effect of the Quebec reform into a parameterized estimate of the relationship between the tax price of employer-provided supplementary health insurance and coverage by such insurance. This parameterized estimate can then be compared to estimates that have used other sources of variation to estimate the relationship between the tax price of insurance and coverage by such insurance.

To calculate the tax price, I impute federal, provincial, and payroll marginal tax rates for individuals in my data set.²⁴ The imputation takes into account federal and provincial taxes and surtaxes, various tax credits, and federal payroll taxes for unemployment insurance and for the Canadian Pension Plan/Quebec Pension Plan. It also takes account of the differential consumption tax treatment of supplementary health insurance compared to other services due to provincial sales taxes on group supplementary health insurance and provincial premium taxes on insured group supplementary health insurance plans.²⁵

Table 5 reports the results from estimating Eq. (4) by OLS and by IV. The OLS estimate of the effect of the tax price to employer-provided supplementary health insurance on coverage by such insurance is -0.322 . This is almost half of the magnitude of the IV estimates which are -0.560 or -0.595 depending on the

Table 5
Effect of tax price on probability employer provides supplementary health insurance^a

	Ordinary least squares	Instrumental variables	
	(1) Full covariates specification	(2) Limited covariates specification	(3) Full covariates specification
Coefficient on TAXPRICE	-0.322^{***} (0.080)	-0.595^{***} (0.070)	-0.560^{***} (0.079)
Implied elasticity of coverage with respect to the tax price.	-0.264^{***} (0.066)	-0.488^{***} (0.057)	-0.459^{***} (0.065)
<i>N</i>	5377	5449	5377

^a Notes: The first row reports the results from estimating Eq. (4). The second row reports the elasticity implied by the estimated coefficient on TAXPRICE. Elasticities are reported relative to pre-reform Quebec means. Standard errors are in parentheses. They are adjusted for heteroscedasticity and for province \times year correlation in the error term. Regressions are weighted.

*** Significant at the 1% level.

²⁴Information on these rates comes from Canadian Tax Foundation (1992) and Canadian Tax Foundation (1995). I am grateful to Kevin Milligan for his help in navigating the intricacies of the Canadian tax system.

²⁵A more detailed description of the way in which tax price is calculated is provided in the earlier working paper version of this paper.

specification. In the only other estimate I know of of the effect of the tax price of employer-provided supplementary health insurance in Canada, Stabile (1999) estimates a coefficient on tax price of -0.417 . This estimate is close to my OLS estimate. This is not surprising: Although the estimates use different data sets and different years (as well as slightly different specifications), Stabile's estimate, like my OLS estimate is identified off of non-linearities in the tax schedule, after controlling for province of residence, income and other personal characteristics. My results suggest that such an identification strategy produces a considerable downward bias in the estimated effect of the tax price of employer-provided supplementary health insurance on coverage by such insurance.

The IV estimate of Eq. (4), which uses variation in the tax price from the Quebec reform as an instrument for TAXPRICE, is identified solely by changes in the tax price due to the 1993 Quebec reform. The IV results indicate that a ten cent increase in the tax price of employer-provided supplementary health insurance reduces the probability of coverage by this insurance by about 6 percentage points. The implied elasticities are reported in the second row of Table 5. These elasticities are calculated with reference to the pre-reform means in Quebec of the tax price (57 cents) and the probability of the employer providing supplementary health insurance (73%). The IV estimates imply an elasticity of coverage by employer-provided supplementary health insurance with respect to the tax price of -0.46 to -0.49 . This estimate lies between the estimate of -0.32 reported by Gruber and Lettau (2000) and that of -0.68 reported by Royalty (1999). It is considerably lower than the -1.8 elasticity estimated for blue collar workers by Gentry and Peress (1994), although they find virtually no effect for white collar workers so the average elasticity is presumably lower than the reported one. In surveying the US literature more broadly, Cutler (1996) concludes that estimates of the elasticity of demand for employer-provided health insurance tend to lie between 0 and -2.0 , with the "consensus" on elasticities in the range of -0.5 to -1.0 .

The elasticity produced from the Quebec reform thus appears to lie well within the range of estimates reported in the literature. Yet there are several reasons we might have expected *ex ante* that the Quebec reform could have produced substantially different estimates. First, as discussed above, many of the previous papers suffer from problems of identification that could bias the estimated effects. Second, the magnitude of the Quebec reform, which reduced the subsidy to employer-provided health insurance by almost 60% – is considerably larger than the variation in tax price studied in previous work. For example, the cross-state variation in US state income tax rates used by studies such as Royalty (1999), is only 10 percentage points. There could be non-linearities in the effect of the tax subsidy on workplace-based insurance. For example, to the fixed costs of setting up an employee benefit plan or the potential for an adverse selection spiral that may result once healthy workers are no longer subsidized enough to make them

willing to pool with less healthy workers could produce such non-linearities.²⁶ The potential for such non-linearities makes estimates based on large variation in the tax price particularly useful for assessing the likely impact of a complete removal of the tax subsidy to employer-provided health insurance.

Third, almost all of the previous estimates are from the United States. The responsiveness of coverage by employer-provided health insurance in Canada may differ from that in the United States. Private health insurance in the United States is considerably more comprehensive than in Canada. We might expect the demand for supplementary coverage to be more price elastic than the demand for more comprehensive coverage. On the other hand, unionization rates are much higher in Canada than in the United States, and, as discussed below, I find a substantially larger response to the tax change among non-union members than union members. This might lead us to expect a lower elasticity in Canada than in the United States.

4.3. Additional results for the group market

The preceding sections have presented the central estimate of the 13.1–13.6 percentage point decrease in employer provided supplementary health insurance in Quebec associated with the tax reform and a resulting elasticity workplace of coverage with respect to the tax price of -0.46 to -0.49 . In this section I consider three additional effects of interest.

First, I examine whether certain types of workers were more likely than other types to lose employer-provided supplementary health insurance coverage in response to a change in the tax subsidy in Quebec. To do this, I estimate Eq. (3) separately for different groups of workers. Some of the results are reported in Table 6. I find that the effect of the Quebec tax reform on coverage by employer-provided supplementary health insurance varies substantially by gender. Indeed, while the reform is associated with a decline in coverage for men from 17.6 to 19.3 percentage points, the decline in coverage for women ranges only from 5.2 to 6.5 percentage points. The estimated effect of the reform is statistically significantly different for men and for women at at least the 5% level in all specifications. This result is puzzling as there is no a priori reason to expect coverage to be less sensitive to the tax price for women than for men. Nor is the estimated effect for men and women similar in percentage terms. The reform is associated with a 22–24% decline in coverage for men but only an 8–10% decline for women.

A more intuitive result is that the drop in coverage associated with the reform is substantially larger for non-unionized workers than for unionized workers. The estimated effect of the reform is a 7.6–9.7 percentage point drop in coverage for

²⁶These issues are considered in more detail by Pauly (1986) and Gruber and Poterba (1996).

Table 6
Effect of Quebec tax reform on coverage by employer-provided supplementary health insurance for different types of workers^a

	(1) Difference-in- differences	(2) Limited covariates specification	(3) Full covariates specification
Gender			
Men	-0.179*** (0.040)	-0.176*** (0.037)	-0.193*** (0.033)
Women	-0.062 (0.045)	-0.065*** (0.019)	-0.052*** (0.017)
Union Status			
Non-union	-0.179*** (0.043)	-0.173*** (0.027)	-0.149*** (0.022)
Union	-0.083** (0.034)	-0.076** (0.030)	-0.097*** (0.025)
Age			
25–34	-0.117** (0.050)	-0.115*** (0.020)	-0.115*** (0.025)
35–44	-0.147*** (0.049)	-0.147*** (0.027)	-0.128*** (0.022)
45–54	-0.100 (0.071)	-0.103* (0.051)	-0.135** (0.049)
55–64	-0.214** (0.096)	-0.210*** (0.029)	-0.296*** (0.042)

^a Notes: Table reports the estimated coefficient on QUEBEC×AFTER in Eq. (3). In each row, Eq. (3) is estimated separately for the group described in the left-hand column. Standard errors are in parentheses. They are adjusted for heteroscedasticity and in columns (2) and (3) are also adjusted for province×year correlation in the error term. Significance refers to whether effect is significantly different from zero. Regressions are weighted.

*** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

union members compared to a 14.9–17.9 percentage point drop for non-union members. The difference between the estimated effect of the reform for non-union workers compared to the estimated effect for union workers is statistically significant in all specifications. Finally, I also find evidence that the effect of the reform was largest for the oldest group of workers (aged 55–64). The reform is associated with a 21.4–29.6 percentage point drop in coverage by employer-provided supplementary health insurance for workers aged 55–64. In both specifications with covariates, this estimated effect for the oldest age group of workers is statistically significantly larger than the estimated effects for workers in any of the other three age groups (ages 25–34, 35–44, and 45–54). There are no statistically significant differences in the estimated effect of the reform among the other three age groups. The estimated effect of the reform for these other groups ranges from 10.0 percentage points to 14.7 percentage points.

I find no evidence of a differential effect of the reform for workers with different potential experience (measured by age minus education minus 6), or for workers with different labor force attachments (part-time versus full-time, or part-year versus full-year). I also examine whether I may be underestimating the effect of the reform by looking at its effect only in the year immediately following the reform. I estimate the effect of the reform separately for those individuals surveyed in the first half of 1994 and those surveyed in the second half of 1994. The estimated effect of the reform is an 18 percentage point drop for individuals in the second half of the year, compared to a 7 percentage point drop for individuals in the first half of the year; these differences are statistically significant. However, when I compare the effect in the first quarter of 1994 to that in the last quarter of 1994, the difference is smaller (10 percentage points and 14 percentage points respectively) and is not statistically significant. These results suggest that I may be underestimating somewhat the effect of the reform.

Second, since the Quebec reform affected the tax treatment of dental benefits as well as health insurance, I replicate the basic analysis for dental benefits. I re-estimate Eq. (3) using coverage by employer-provided dental benefits as the dependent, binary variable. In results not reported here, I find that there is a statistically significant drop in dental benefits in Quebec compared to the control provinces. As with supplementary health insurance benefits, the magnitude and significance of the result is robust to the inclusion of other covariates and to the inclusion of time-varying covariates. The magnitude of the drop ranges between 6.9 and 7.9 percentage points depending on the specification, and is statistically significant at at least the 5% level in all specifications. However these estimates should be interpreted with some caution. In 1992, the Quebec government instituted minor cutbacks in its public dental benefits program. This public insurance program covers oral surgery for all residents and dental services for children. In 1992, the government reduced the maximum age of eligibility for children, from 15 to 12 years or from 13 to 10 years depending on the specific procedure. Although these reforms were considered relatively minor,²⁷ they nonetheless may have increased the demand for private dental insurance in Quebec during the period in which the tax reform increased the price of private dental insurance. The reported results are therefore probably an underestimate of the effect of the tax reform on coverage by employer-provided dental benefits.

And finally, I consider the effect of a smaller tax reform that occurred in Ontario at the same time as the Quebec reform. In 1993, the Ontario government imposed an 8% sales tax on group health and dental benefits and extended the 2% premium tax previously in place for insured group plans to uninsured group plans. This 8–10 percentage point increase in taxes on group health and dental benefits in Ontario is roughly two-fifths of the average 25 percentage point increase in the tax

²⁷Conversation with Irene Klatt, Director of Health Policy, Canadian Life and Health Association, October 1999.

price from the Quebec reform. In results not reported here, I repeated the above analysis using Ontario as the treatment province instead of Quebec, and using the same 7 unaffected provinces as the control provinces. I find that coverage by employer-provided dental benefits experienced a statistically significant drop in Ontario relative to the control provinces of 4.6–7.5 percentage points depending on the specification; this drop is significant at the 1% level in all specifications. Coverage by employer-provided supplementary health insurance dropped in Ontario relative to the control provinces by 0.01–2.0 percentage points depending on the specification. However, this effect is never statistically significant.

4.4. Effect of the Quebec reform on coverage by non-group supplementary health insurance

We have seen that the reduction in the tax subsidy coincided with a substantial decrease in coverage by employer-provided supplementary health insurance in Quebec. It remains to examine the effect of the reform on total insurance coverage. I therefore examine the effect of the decrease in the subsidy to employer-provided supplementary health insurance in Quebec on coverage by non-group supplementary health insurance, which is not subsidized through the tax code.²⁸ Marquis and Long (1995) have examined the effect of regional differences in price in the non-group market on the effect of non-group coverage in the US. Gruber and Poterba (1994) have examined how the self-employed responded to the introduction of a subsidy to their purchase of non-group insurance in the US. However, I know of no work that has looked at the effect of the tax subsidy to employer-provided health insurance on both group and non-group coverage.

Data on the non-group health insurance market in Canada are limited. There are no available micro data. The data analyzed here come from the Canadian Life and Health Insurance Association's (CLHIA) annual survey of its member companies.²⁹ CLHIA data are available on an annual basis at the provincial level. Data consist of the number of individuals covered, the total dollar value of premia paid, and the total dollar value of claims made. These data are reported separately for the group and the non-group market.³⁰

²⁸In the United States, a tax subsidy to health insurance for the self-employed who buy in the non-group market has been in effect since 1988. A similar subsidy was introduced for the self-employed in Canada in 1998. In both countries, employed individuals who are not offered – or choose not to purchase – health insurance through their employers are not eligible for any tax subsidy in the non-group market.

²⁹The CLHIA is an industry-wide organization of life and health insurance companies in Canada. Their data are widely used; for example, the Canadian Department of Finance uses CLHIA data in estimating the federal tax expenditure from the tax subsidy to employer-provided supplementary health insurance (Government of Canada, 1998).

³⁰I am grateful to Alice Freeburn, Director of Statistics at the CLHIA, for providing me with these data.

CLHIA's membership consists of over 95% of the premia written for group health insurance by for-profit insurance companies, and just under 90% of the premia written for non-group health insurance by for-profit insurance companies. The high, stable market share of CLHIA's member companies suggest that their data will accurately reflect the changes in coverage sold by for-profit companies. The major limitation of the data, however, is that they do not include sales by non-profit insurance companies such as provincial Blue Cross organizations. CLHIA member companies therefore account for only about 70% of the total number of private insurance policies in Canada.³¹ Since the CLHIA data tell us nothing about changes in coverage sold by non-profit insurers, the data will present a misleading picture if trends in non-profit insurance sales by province differed from trends in for-profit insurance sales by province.

Fig. 1 shows trends in non-group coverage of supplementary health insurance in Quebec relative to the control provinces. Annual data are from December 31 of the year shown. The figure indicates that between 1989 and 1992, trends in the number of policyholders in the individual market are roughly similar in Quebec and the control provinces, although there is a slight increase in Quebec relative to the control provinces (about 12,000 policyholders between 1989 and 1992). Between the end of 1992 and the end of 1993 – the period of the Quebec reform – the number of non-group policyholders fell sharply in the control provinces relative to Quebec. There is also some indication of a larger increase in the number of policyholders during 1994 and 1995 in Quebec relative to the control provinces.

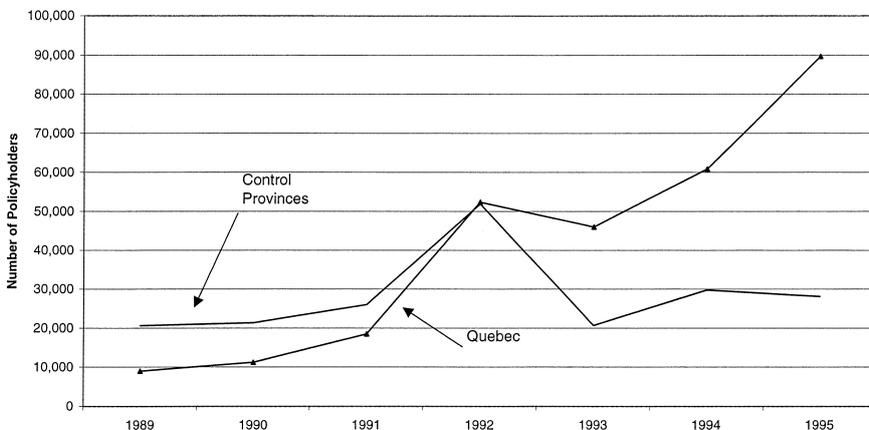


Fig. 1. Trends in non-group health insurance.

³¹ In 1994, CLHIA companies covered 14.2 million individuals with supplementary health insurance. Mercer (1995) reports that in 1994, there were approximately 20 million Canadians with some supplementary health coverage under a private plan.

Taken together, the evidence is suggestive of an increase in coverage in the non-group market in Quebec relative to the control provinces.³²

But the magnitude of the increase is small relative to the decrease observed in the group market. The increase in coverage in the non-group market in Quebec relative to the control provinces between 1991 and 1994 is about 38,500 policies. Allowing for the fact that the CLHIA data encompass about 70% of the total market for health insurance in Canada, this suggests an increase in coverage in the non-group market in Quebec relative to the control provinces of roughly 55,000 policies. This increase in the non-group market represents only 15% of the estimated 360,000 policy decrease in group coverage in Quebec relative to the control provinces between 1991 and 1994.³³ Of course, this may be an overestimate of the effect of the reform on coverage in the non-group market, given the slight upward trend in coverage in the non-group market in Quebec relative to the control provinces before the reform. Adjusting for this trend – about 4000 policies per year – the increase in coverage in the non-group market between 1991 and 1994 attributable to the reform is then only about 38,000 policies, or just over 10% of the estimated decrease in group coverage.

The reduction in the tax subsidy to employer-provided supplementary health insurance is therefore associated with a substantial net decline in insurance coverage. With any good, we expect that the reduction of a subsidy – i.e. an increase in price – results in a net decrease in demand. Without external evidence about the price elasticity of demand for supplementary health insurance, it is not possible to say whether the lack of a more substantial offset in the non-group market in Quebec is attributable solely to the fact that the non-group market is not subsidized or whether it is also due to the higher administrative costs and greater scope for adverse selection in the non-group market relative to the group market.³⁴

5. The role of the tax subsidy in creating workplace based insurance pools

We have seen that the reduction in the tax subsidy to employer-provided supplementary health insurance in Quebec coincided with a substantial decrease in coverage by employer-provided supplementary which was not offset by an increase in coverage by the non-group market. Yet the tax subsidy is not the only advantage offered by workplace-based insurance over the non-group market. A

³²The analysis looks the same when coverage rates in the adult population are analyzed instead of number of policies.

³³This estimate for the group market is based on GSS data of a sample of all ages, to make it comparable to the estimate for the non-group market. It is not restricted to 25–64 year olds, as is the analysis in the rest of the paper.

³⁴The CLHIA data indicate that administrative loads, measured as the excess of premia over claims as a percentage of claims paid, are an order of magnitude lower in the group market compared to the non-group market (21% compared to 213%).

central question is the degree to which the predominance of health insurance through the workplace is a function of the tax subsidy rather than of the economies of scale and reduced adverse selection through pooling that workplace-based insurance also offers.

This section tries to shed some light on the relative role of tax subsidies in creating workplace-based insurance pools by examining how the effect of the reduction of the tax subsidy in Quebec varies across firms of different size. As noted by Stabile (2000), the tax subsidy to employer-provided supplementary health insurance applies to firms regardless of their size, but the other potential gains associated with workplace-based health insurance – reduced administrative costs and adverse selection problems – are much more of a factor in large firms rather than small firms. The role of the tax subsidy may therefore be quite different in large and small firms, and this differential role can shed light on the importance of other advantages of workplace-based insurance.

Data on firm size are available in the 1989 GSS and the 1994 GSS but not in the 1991 GSS. Results by firm size are therefore reported based on estimation of Eq. (3) using a pooled cross-section of the 1989 and 1994 GSS. All prior estimation of Eq. (3) used a pooled cross-section of the 1991 and 1994 GSS. As is discussed in more detail in Section 6, coverage by employer-provided supplementary health insurance is trending similarly in Quebec and the control provinces between 1989 and 1991. Therefore any difference between Quebec and the control provinces in the trend in coverage between 1989 and 1994 is presumably driven by the same factors that drives such differences between 1991 and 1994.

Table 7 reports the estimated effect of the reform for workers in firms of different sizes. The effect of the reform decreases mostly monotonically with the size of the firm.³⁵ The largest difference in the effect of the reform by firm size is observed between firms with less than twenty employees and firms of all other sizes. Indeed, in all of the specifications with covariates, the difference between the effect of the reform in firms with less than 20 employees and the effect of the reform in any other size category of firm is statistically significant at at least the 5% level. Differences in the effect of the reform between any of the other three size groupings are never statistically significant. The effect of the tax subsidy therefore appears to be substantially greater in firms with less than 20 employees than in firms of larger size.

The estimated effect of the reform in firms with less than 20 employees ranges from a 19 percentage point decrease to a 26 percentage point decrease. In firms with 500 or more employees, by contrast, the reform is associated with only a 6–7 percentage point decrease. Before the reform, the probability of receiving employer-provided supplementary health insurance in Quebec was 52% in firms with less than 20 employees, compared to 95% in firms with more than 500

³⁵This finding of a larger effect of the tax subsidy in smaller firms is consistent with similar comparisons by firm size done by Gruber and Lettau (2000) and Stabile (2000).

Table 7
Effect of Quebec tax reform on coverage by employer-provided supplementary health insurance for firms of different sizes^a

	(1) Difference-in- differences	(2) Limited covariates specification	(3) Full covariates specification
500+ employees	−0.067** (0.031)	−0.058*** (0.016)	−0.068*** (0.014)
100–499 employees	−0.071 (0.059)	−0.071** (0.033)	−0.058 (0.050)
20–99 employees	−0.152*** (0.075)	−0.073 (0.065)	−0.092 (0.058)
Less than 20 employees	−0.202*** (0.072)	−0.191*** (0.033)	−0.257*** (0.023)

^a Notes: Table reports the estimated coefficient on QUEBEC×AFTER in Eq. (3). Each row reports the estimated coefficients for individuals in a given size firm. Regressions are based on a pooled cross section of 1989 and 1994 data. Therefore the full covariate specification could not control for health status, since this variable is not available in 1989. Standard errors are in parentheses. They are adjusted for heteroscedasticity and in columns (2) and (3) are also adjusted for province×year correlation in the error term.

*** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level. Significance refers to whether effect is significantly different from zero. Regressions are weighted.

employees. Therefore, the Quebec reform was associated with a 36–50% decrease in group coverage in firms with less than 20 employees but only a 6–7% decrease in firms with more than 500 employees.

A linear extrapolation from these effects to the effect of a complete removal of the tax subsidy, which would have raised the tax price from 57 cents to \$1.11 (because of the excess consumption taxes), suggests that complete removal of the tax subsidy would reduce coverage by employer-provided supplementary health insurance by 13–15 percentage points in firms with more than 500 employees and by 41–56 percentage points in firms with less than 20 employees. Results based on out of sample predictions need to be interpreted with caution and are sensitive to the linearity assumption. With these caveats in mind, however, this extrapolation, together with the initial coverage levels in small and large firms, is supportive of the idea that complete removal of the tax subsidy to employer-provided supplementary health insurance in Canada could completely eliminate employer-provided supplementary health insurance in small firms, while reducing coverage in large firms by only about 15%.

These results therefore suggest that the tax subsidy plays a very important role in getting small firms to offer supplementary health insurance. Since problems of adverse selection and high administrative loads are likely to be almost as severe in firms with less than 20 employees as in the non-group market, it is not surprising

that the tax subsidy is critical to getting such firms to offer insurance.³⁶ In large firms, where gains from pooling and economies of scale are substantially larger, the tax subsidy appears to have a small but not solitary role in getting such firms to provide insurance. This suggests that while the prevalence of insurance in large firms is not primarily a function of a the tax subsidy, the high rates of insurance provision in very small firms compared to the non-group market is likely to arise almost entirely from the tax subsidy.

6. Falsification exercises

The interpretation of the main results in the preceding sections is based on the identifying assumption that, absent the tax reform in Quebec, coverage by employer-provided supplementary health insurance in Quebec and in the control provinces would have followed similar trends between 1991 and 1994. In this section, I take two different approaches to testing the validity of this identifying assumption. First, I look at whether coverage by employer-provided supplementary health insurance was trending similarly in Quebec and the control provinces before the reform was enacted.³⁷ To do this, I compare changes in coverage by employer-provided supplementary health insurance in Quebec between 1989 and 1991 to changes in the control provinces between 1989 and 1991.³⁸ In other words, I re-estimate Eq. (3) using 1989 as the “before” period and 1991 as the “after” period.

Panel A of Table 8 reports the coefficient on the “treatment effect” (QUEBEC*AFTER) from these regressions. The small and insignificant estimated effect of QUEBEC*AFTER indicates that coverage by employer-provided supple-

³⁶For example, in the United States, administrative loads decline monotonically from 40% in firms with 1–4 employees to 5.5% in firms with more than 10,000 employees (Council of Economic Advisers, 1994).

³⁷Although in principle I could carry out a similar exercise after the reform was enacted, in practice the GSS does not provide any information on employer-provided supplementary health insurance after the 1994 Cycle.

³⁸1989 is the first year before 1991 in which the GSS asks about employer-provided supplementary health and dental benefits. The 1989 GSS follows the same survey design as the 1991 and 1994 GSSs. There is a minor difference in the phrasing of the question used for the dependent variable for medical benefits. While the 1991 and 1994 surveys ask about employer provision of medical benefits “beyond those provided by your provincial health care system,” the 1989 question does not include this caveat. However, people whom I contacted felt that individuals would not confuse this question with publicly provided insurance (Conversations with Alice Freeburn, Director of Statistics Canadian Life and Health Association, and Nancy Turner, Housing, Family, and Social Statistics Division of Statistics Canada, October 1999). Moreover, even were there to be some confusion, this would only contaminate the analysis if the probability of misinterpreting the question differed systematically between residents of Quebec and residents of the control provinces. Again, there is no evidence to suggest that this would be the case.

Table 8
Falsification exercises^a

Dependent variable	(1) Difference-in- differences	(2) Limited covariates specification	(3) Full covariates specification
Panel A: Probability employer provides benefits 1989 vs. 1991 Quebec vs. control provinces			
Supplementary health insurance	0.033 (0.029)	0.042 (0.034)	0.017 (0.030)
Panel B: Probability employer provides other employee benefits 1991 vs. 1994 Quebec vs. control provinces			
Pension	0.002 (0.032)	-0.003 (0.035)	-0.005 (0.045)
Paid parental leave	-0.010 (0.034)	-0.021 (0.063)	-0.022 (0.063)

^a Notes: Standard errors are in parentheses. They are adjusted for heteroscedasticity and in columns (2) and (3) are also adjusted for province×year correlation in the error term. Regressions are weighted. *Panel A*: Numbers in the table are the estimated coefficient on QUEBEC×AFTER in Eq. (3). But here, Eq. (3) is estimated using 1991 and 1989 data. AFTER is therefore a dummy variable equal to 1 if the observation is from the 1991 survey and 0 if it is from the 1989 survey. Columns have the same controls as the corresponding columns in previous tables (except that there are no health controls in column 3 since health status information is not available in 1989). *Panel B*: Numbers in the table are the estimated coefficient on QUEBEC×AFTER in Eq. (3). But here, Eq. (3) is estimated on 1991 and 1994 data with a binary dependent variable that indicates coverage by the employee benefit shown in the left hand column. Columns have the same controls as corresponding columns in previous tables.

mentary health insurance is following the same trend in Quebec relative to the control provinces between 1989 and 1991. Fig. 2 illustrates the trends in coverage between 1989 and 1999 in Quebec and in the control provinces. This supports the identifying assumption for health insurance.³⁹

The second type of falsification exercise looks at changes in coverage rates between 1991 and 1994 for two other employee benefits: retirement pensions and paid parental leave. We might be concerned that there was a Quebec-specific shock between 1991 and 1994, other than the tax reform, which caused the relative drop in coverage by employer-provided supplementary health insurance in Quebec. One way to look for the presence of such a shock – such as a worsening business climate or increased administrative costs of running employee benefit plans – is to

³⁹In results not reported here, I also perform this exercise for dental benefits. The results for dental benefits are not supportive. Coverage by employer-provided dental benefits is rising in Quebec relative to the control provinces between 1989 and 1991. In fact, the relative rise is of slightly larger magnitude than the relative drop between 1991 and 1994. This again points to caution in interpreting the estimated effect of the 1993 reform on dental benefits.

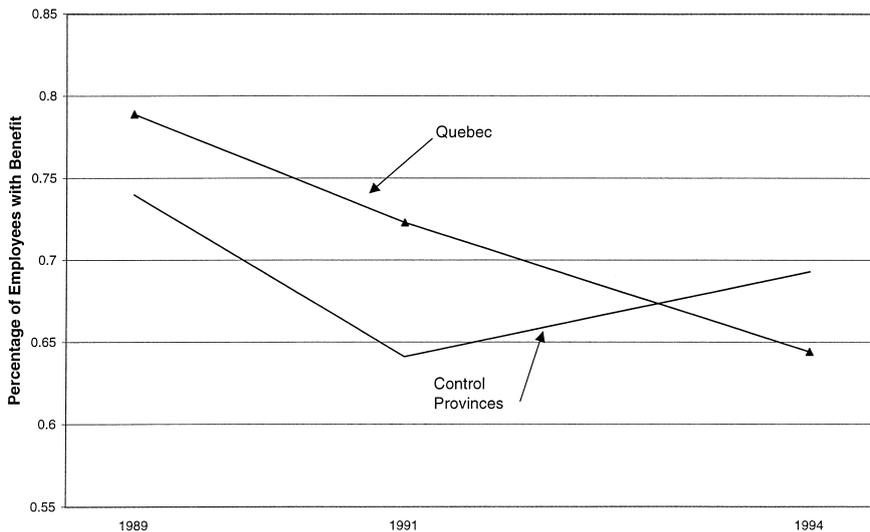


Fig. 2. Trends in employer-provided supplementary health insurance.

see whether other employee benefits that were not affected by the tax reform also experienced a relative decline in Quebec.⁴⁰

I therefore re-estimate Eq. (3) using coverage by employer-provided retirement pensions and coverage by employer-provided paid parental leave as the dependent binary variables.⁴¹ Panel B of Table 8 reports the results of this set of falsification exercises. Fig. 3 shows the results graphically for employer-provided pensions. Across all specifications, there is no significant change in coverage rates of either pensions or paid parental leave in Quebec relative to the control provinces between 1991 and 1994. The estimated changes in these employee benefits in Quebec relative to the control provinces are not only statistically insignificant, but are also extremely small in magnitude compared to the relative change observed for supplementary health insurance. For example, for pensions, the largest estimated effect is an insignificant drop of 0.5 percentage points in coverage in Quebec

⁴⁰Neither retirement pensions nor paid parental leave were affected by the 1993 Quebec reform. Employer contributions to private retirement pensions are excluded from an employee's taxable income. Paid parental leave is a taxable benefit (Koskie et al., 1995; Nielson, 1998).

⁴¹The General Social Survey provides information on employer provision of one other benefit: counseling services for a variety of personal problems. However, the 1993 Quebec reform that made employer contributions to health and dental benefits taxable also reduced the list of problems for which employer-financed counseling services are tax exempt. In results not reported here, I find some evidence of a decrease in counseling services in Quebec relative to the rest of Canada. The estimated decrease ranges from 4.4 to 5.6 percentage points and is significant at the 5% level in both the limited and full covariates specification.

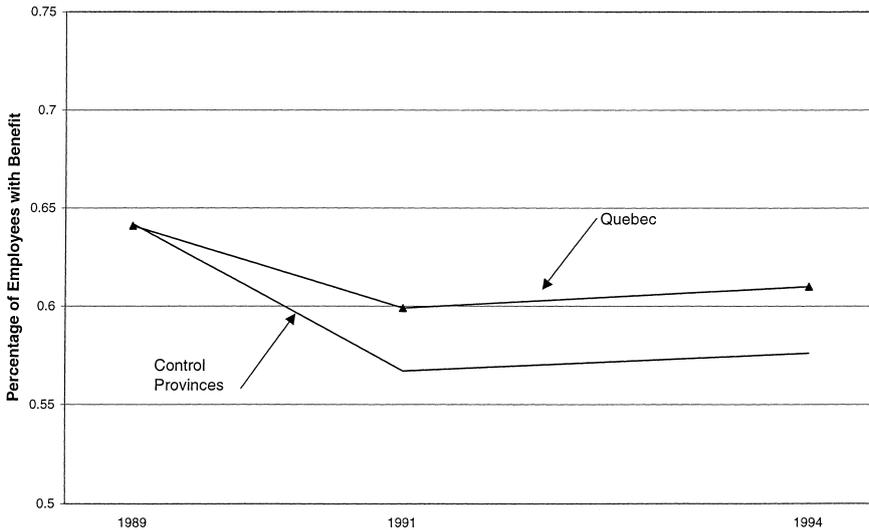


Fig. 3. Trends in employer-provided pensions.

relative to the control provinces between 1991 and 1999. Fig. 3 shows coverage trends for employer-provided pensions.

The assumption underlying this falsification exercise is that the determinants of coverage for employer-provided supplementary health insurance are similar to the determinants of coverage for these other employee benefits. Several other results lend support to this hypothesis. First, the coverage rates for these other benefits is on the same order of magnitude as the coverage rate for supplementary health insurance.⁴² Second, the effects of various covariates on the probability of coverage by a given employee benefit are extremely similar across the different benefits. And third, I find that in the pre-reform period (1989–1991), pensions and paid parental leave coverage, like coverage by supplementary health insurance, are on a downward trajectory.

7. Conclusion

This paper has presented new evidence of the effect of the tax subsidy to employer-provided supplementary health insurance on coverage by such insurance. The 1993 removal of the Quebec provincial tax subsidy to employer-provided supplementary health insurance, while leaving in place the federal tax subsidy and

⁴²The probability of coverage for the full sample is 0.67 for employer-provided supplementary health insurance, 0.59 for pensions, and 0.43 for paid parental leave.

the payroll tax subsidy, reduced the total tax subsidy to employer-provided supplementary health insurance in Quebec by almost 60%. I estimate that this reduction in the tax subsidy resulted in a 13–14 percentage point decrease in supplementary health insurance coverage through the workplace. This represents a decline in workplace coverage of about one fifth, and corresponds to an elasticity of coverage by employer-provided supplementary health insurance with respect to the tax price of -0.46 to -0.49 . This elasticity lies well within the range of previously estimated elasticities in the United States of employer offering of health insurance with respect to the tax subsidy. I find that decreases in coverage through the workplace associated with the tax reform are only slightly offset by increases in coverage in the non-group market. I estimate that the increase in coverage in the non-group market in Quebec relative to the control provinces was only about 10–15% of the decrease in workplace coverage.

The evidence also suggests that a tax subsidy to employer-provided supplementary health insurance plays a large role in explaining the provision of such insurance in small firms, but a considerably smaller role in large firms. This result is consistent with the notion that large firms offer other advantages as a source of insurance – such as risk pooling and economies of scale in administration – that would make them attractive venues for insurance even absent the subsidy. The appeal to offering supplementary health insurance in small firms, however, where gains from risk pooling and economies of scale are considerably lower, appears to be much more sensitive to the tax subsidy.

Several related questions were not explored in this paper due to limitations of the data. First, it would be interesting to study the effect of the tax subsidy on other margins of coverage besides the binary measure of whether the individual's employer provides coverage. The response to a change in the tax subsidy may operate partly through changes in intensive margins of coverage, such as decreases in maximum claims, reductions in services covered, and increases in employee co-payments and deductibles. To the extent that such changes occurred, the examination solely of the extensive coverage margin undertaken here underestimates the decrease in insurance coverage due to the tax reform. Second, the reduction of the tax subsidy to employer-provided health insurance reduces the rationale for employer (as opposed to employee) contributions to health insurance premia. Increased employee contributions should affect margins such as take-up conditional on offering and therefore, in turn, the scope for adverse selection in a workplace pool. Finally, it would also be interesting to explore the consequences of the reduction in the tax subsidy for utilization of privately and publicly insured health services, and for health outcomes.

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