2010s-36

The Incidence of Payroll Taxes in Ontario and Quebec: Evidence from Collective Agreements for 1985-2007

Édison Roy-César, François Vaillancourt

Série Scientifique
Scientific Series

Montréal
Septembre 2010

CIRANO
Allier savoir et décision

Centre interuniversitaire de recherche en analyse des organisations

The incidence of Payroll Taxes in Ontario and Quebec; Evidence from collective agreements for 1985-2007[*]

Édison Roy-César[†], François Vaillancourt[‡]

Résumé / *Abstract*

Cette étude utilise une base de données originale regroupant les conventions collectives couvrant plus de 500 employés signées au Québec ou en Ontario de 1985 `à 2007 et des informations sur les taxes sur la masse salariale et d'autres variables, afin de mesurer l'effet d'une augmentation de taxe sur la masse salariale. Les résultats de ce modèle indiquent qu'après un an, une augmentation d'un point de pourcentage des taxes générales sur la masse salariale fait diminuer la croissance des salaires de 1/2 point de pourcentage au Québec et 3/10 de point de pourcentage en Ontario.

> **Mots clés** : Taxe sur la masse salariale, incidence, conventions collectives, salaires

This study uses an original data set, combining information for all collective agreements covering more than 500 employees signed in Quebec or Ontario from 1985 to 2007 and information on payroll taxes and other variables, to measure the incidence of an increase in payroll tax. The results of this model show that that after one year, a one percentage point increase in the general payroll tax reduces wages growth by 1/2 of a percentage point in Quebec and 3/10 of a point in Ontario.

> **Keywords:** *Payroll taxes, incidence, collective agreements, wages*

> **Codes JEL** : H22, H24, H32, J32, J38

Introduction

The purpose of this study is to measure the incidence of payroll taxes on wages in order to further our understanding of this type of tax. This is of interest since these taxes play an increasing role in financing government spending in Canada; the importance of payroll taxes in Canada as a percentage of GDP increased from 1.4% in 1965[1] to 4.9 in 2006[2]. Yet the actual impact of payroll taxes levied on employers on labour costs, wages and employment is uncertain due to the possibility of some shifting of the tax burden. This paper is organized in three parts. Part 1 briefly summarizes the relevant literature on the incidence of payroll taxation and presents the model used. Part 2 presents the institutional background of payroll taxation in Canada and the data used in the study. Part 3 analyzes the results of the estimations. One should note that this study uses an original data set containing all collective agreements covering 500 employees or more that were signed in Quebec or Ontario during the 1985-2007 period., matched to payroll taxes and in particular WCB premiums.

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[1] Lin, Z., Picot, G. And Beach, C. (1996).
[2] Statistiques des recettes publiques des pays membres de l'OCDE 1965-2007, OCDE, Paris 2008, Tables 14 and 39.

1.1 Literature review and model.

Employers can attempt to shift a payroll tax levied on them to workers by paying them lower wages than in the absence of the tax. If they succeed completely in this shifting of the tax, their labour costs post and pre tax will remain the same and this will have no effect on their demand for labour but may reduce the supply if it is elastic towages. The degree of shifting is an empirical issue depending on the relevant characteristics of each and every labour market. We thus present five empirical studies of this shifting

The first econometric study on payroll taxation that we review is by Brittain (1971). This study uses the ordinary least square method (OLS) to estimate a cross-sectional regression. The data on wages and employment come from manufacturing censuses for 1958, but the author also adds any other census in the period of 1957 to 1959. The data set contains 64 countries and up to 12 different industries which gives a total of 407 observations. The effective tax rates were estimated from the statutory rates, which are set in each country by the government. Various dependent variables are used. The author finds an incidence of -1.14 to -1.60 depending on the dependent variable used. These coefficients are not significantly different from one. The conclusion of the author is that for a given level of productivity in a country, an increase in payroll taxes lowers mean nominal wages by the exact amount of the tax. Thus this study finds evidence of backward shifting of the payroll tax through lower wages for workers.

The second econometric study we review is by Holmlund (1983). This study uses a data set for Sweden in which wage rates refer to average hourly earnings for adult blue-collar male who work in mining and manufacturing. The author constructs an aggregate wage measure adjusted for inter-industry employment shifts and excluding overtime premiums for the period of 1949 to 1979.

The author uses OLS and two-stages least squares (2SLS) time series regression to measure the incidence of payroll taxes on wages. This study obtains an incidence of payroll taxation of -0.492 for the simple OLS regression and -0.462 for the 2SLS regression. Thus, the findings suggest that only a fraction of payroll tax increase were directly shifted back to workers as lower wages. These results rely on a time span of 1 year which limits the measured incidence to the short-term effects of a payroll tax increase; it is possible that the long-term incidence also falls on labour,

despite the fact that the short-run analysis suggests partial backward shifting to workers as lower wages. Moreover, these results also suggest the presence of a significant incidence on employment in the short-run.

The third econometric study reviewed here is that of Vaillancourt and Marceau (1990) which draws on Marceau (1988)[3]. The study uses panel data for large (500 employees and over) individual collective agreements in Quebec (Canada) as collected by Labour Canada during the period of 1975 to 1984. The authors estimate a wage determination equation with the (OLS) pooled regression method. The paper finds that the rate of change in the sum of the general payroll taxes has an impact on wages between -0.247 and -0.0389 while the rate of change in the firm-specific payroll tax has an impact of 0.0266 or 0.0260. The authors also tried to aggregate the two types of taxes, but the payroll tax coefficients are not significant. The main conclusion of this paper is that previous research on payroll taxes arrived to a wide range of estimates which sometime seemed incompatible because they did not distinguish general from firm-specific payroll tax. The model that was used in Vaillancourt and Marceau (1990) will be the model used in this paper.

The fourth econometric study reviewed is by Gruber (1997). This study takes advantage of Chile's privatization of the social security system in 1981 (a natural experiment) which led to an important reduction in the payroll tax to measure the incidence of payroll taxation in Chile. This study uses data from a survey of all Chilean manufacturing plants which counted more than ten employees over the period of 1979-1986 (1979, 1980, 1984 and 1985 data are used).The author creates payroll tax rates for each firm by dividing total tax payments by wages. The author estimates four different regressions: the incidence of a 1 percentage point decrease in payroll tax varies from 1.022 to 1,561 %. Hence the reduction of payroll tax rates on firms increased the wages by the amount of the tax which suggests full backward-shifting.

The last econometric study reviewed here is by Krugler and Krugler (2008). It paper uses a balanced panel of plants from the Annual Survey of Manufacturers in Colombia over the period 1982-1996. Without controlling for sector-specific effects, a 1% increase in payroll tax rate

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[3] Marceau, N. (1988), Incidence à court terme sur les salaires de la croissance des taxes sur la masse salariale, M. Sc. (Université de Montréal, Montréal, Québec).

reduces wages by 0,142%; controlling for sector specific trends the impact is 0,187% while when controlling for plant-specific the effect is 0,235%. Thus the results of this study imply partial backward shifting. The authors argue that this "less-than-full-shifting" could be explained by the weak linkages between benefits and taxes and the downward wage rigidities which characterise the Colombian labour market.

We summarize these five studies in table 1.

Table 1
Summary of the studies reviewed

Author(s) and year	Subject	Variables	Data	Estimation Method	Results
Brittain (1971)	Econometric study of the incidence of payroll taxation an inter-country apporch.	**Dependent variable:** 1) Value-added per labour input. 2) Wage. **Independent variables:** 1)Wage and -Log(1+taxe). 2) Value-added per labour input and -log(1+taxe). **Dichotomous variables:** Industries.	The data on wages and employment come from manufacturing censuses for 1958, while some additional observations came from the 1957 and 1959 census. The data set contains 407 observations on 64 countries. **Payroll taxes:** The effective tax rates were estimated from the statutory rates. The general and specific taxes were aggregated.	This study uses the ordinary least square method (OLS) to estimate a cross-sectional regression of aggregative data among different countries. This approach gives the long-run incidence of a payroll tax on wages.	Incidence of -1,14 to -1,60 which in not significantly different from a coefficient of unity. For a given level of productivity in a country, an increase in payroll taxes lowers mean wages for workers by the exact amount of the tax. **(This study finds full Shifing).**
Holmlund, B. (1983)	This study adopts a short term approach, time span of 1 year, to analyse the postwar incidence of the payroll taxes increase on wages in Sweden.	**Dependent variable:** 1) First difference of Log (wage). **Independent variables:** Log of 1 + the payroll tax rate , log of 1 minus the average income tax rate, log index of volume of production divided by the output trend, log of the current and lagged one year producer price index for industrial products (PPI and PPI-1) and the log of the consumer price index (CPI).	This study uses a data set in which wage rates refer to average hourly earnings for adult blue-collar male who work in mining and manufacturing. The author constructed a new aggregate wage measure adjusted for inter-industry employment shifts and excluding overtime premiums. The number of observations in the data set is not available in the paper. **Payroll taxes:** The general and specific taxes were aggregated. The statutory payroll tax rates were used.	1) OLS time series regression. 2)2SLS time series regression where the current producer price index (PPI) was instrumented.	This study measures an incidence of payroll taxation of -0.492 for the simple OLS regression and -0.462 for the 2SLS regression. Thus, the findings suggest that only a fraction of payroll tax increase were directly shifted back to workers as lower wages. **(This study finds partial Shifing).**
Vaillancourt and Marceau (1990)	This study uses Canadian panel data to measure the incidence of general and specific payroll taxes.	**Dependent variable:** The negotiated rate of growth of base wages. **Independent variables:** The rate of change of general payroll taxes and specific payroll taxes, the average vacancy rates, the rate of change in the consumer price index (CPI). **Dichotomous variables:** A a dichotomous variable which indicates the presence of cost of living agreement clause (COLA), dichotomous variables for industries and a dichotomous variable for wage controls.	The study uses panel data for large (500 employees and over) individual collective agreements in Quebec as collected by Labour Canada (1975-1984). The data set contains 780 observations on the collective agreements signed in Quebec during the period. **Payroll taxes:** UI, Q.P.P, CNT, HSF, CSST. The general and specific taxes were incorporated separetely in the model. They impute the average payroll tax rates based on the province and the sector of the business.	The authors estimate a wage determination equation for the province of Quebec with the (OLS) pooled regression method.	The general taxes had a negative impact on the negotiated rate of growth of base wages, while the specific taxes had a positive impact. Previous research on payroll taxes arrived to a wide range of estimates, which could be explain by the failure of the previous studies to distinguish general taxes from specific taxes. **(This study finds partial Shifing).**

Gruber (1997)	This study takes advantage of Chile's experience before and after the privatization of its social security system which led to an important exogenous reduction in the payroll tax burden on Chilean firms, to estimate the impact of payroll taxation.	**Dependent variable:** 1) First difference of Log (wage). 2) First difference of Log (employment). **Independent variables:** The difference of the constructed tax rates. **Dichotomous variables:** Time dummies and dummy for workers group.	Survey of all Chilean manufacturing plants which counted more than ten employees over the 1979-1986 period. This data set has information on total wages, employment and payroll taxes paid, information on blue and white collar workers. The data set contains 6066 observations on the wages of Chilean firms. **Payroll taxes:** The general and specific taxes were aggregated. They use firm-level data on total wage to construct the tax rates.	1) Basic difference pooled regression (OLS). 2) Basic difference pooled regression with plant effect (OLS). 3) Basic difference pooled regression with instrumental variable for group payroll taxe (IV). 4) Basic difference pooled regression with area and industries as a grouping of instrumental variables (IV).	Results Reg 1) -1,20 on wages and no effect on employment. Results Reg 2) -1,022 on wages and no effect on employment. Results Reg 3) -1,412 on wages and no effect on employment. Results Reg 4) -1,561 on wages and no effect on employment. The privatisation of Chile social insurance system which led in a reduction of payroll tax rates on firms increased the wages by the amount of the tax and had no effect on employment. **(This study finds full Shifing).**
Kugler and Kugler (2008)	This paper uses a panel of manufacturing plants from Colombia to estimate how the rise in payroll tax rates over the 1980s and 1990s affected wages and employment.	**Dependent variable:** The difference of total wages per employees. **Independent variables:** The constructed tax rates (total wages / employees), sector effects and plant effects. **Dichotomous variables:** Variable for production jobs and years.	The study uses a balanced panel of plants in the formal sector from the Annual Survey of Manufacturers in Colombia over the period 1982-1996. The data set contains information on total contributions, wages and employment. The data set contains 470 observations on the wages of Colombian firms. **Payroll taxes:** The general and specific taxes were aggregated. They use firm-level data on total wage to construct the tax rates.	This study uses the ordinary least square panel regression method (OLS) to estimate a balanced panel regression in first differance.	Without controlling for sector-specific effects suggest that a 1% increase in payroll tax rate reduces wages by 0,142% and employment by 0,273%. Controlling for sector specific trends gives larger effects on both wages and employment. The results suggest that a 1% increase in the payroll tax rate reduces wages by 0,187% and employment by 0,305%. With plant-specific trends result suggest that a 1% increase in the payroll tax rate reduces wages by 0,235% and employment by 0,384%. **(This study finds partial Shifing).**

Sources:

-Brittain, J.A. (1971), "The Incidence of Social Security Payroll Taxes", The American Economic Review, Vol. 61, No. 1, pp.110-125.

-Holmlund, B. (1983), "Payroll Taxes and Wage Inflation: The Swedish Experience", The Scandinavian Journal of Economics, Vol. 85, No. 1, pp.1-15.

-Vaillancourt, F. and Marceau, N. (1990), "Do general and firm-specific employer payroll taxes have the same incidence? Theory and evidence", Economics Letters, No. 34, pp. 175-181.Gruber, J. (1997), "The Incidence of Payroll Taxation: Evidence from Chile", Journal of Labour Economics, Vol. 15, No. 3, pp. S72-S101.

-Gruber, J. (1997), "The Incidence of Payroll Taxation: Evidence from Chile", Journal of Labour Economics, Vol. 15, No. 3, pp. S72-S101.

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1.2The model

The model used in this research is the standard wage equation augmented by the tax variables, which was used in Vaillancourt and Marceau (1990).[4] In this paper we estimate an equation which is similar to the one used in Vaillancourt and Marceau (1990),using however the unemployment rate as opposed to the vacancy rate since that data are not available for the full period we examine. Thus, the equation estimated is;

$$W_i = \beta_0 + \beta_1 GPT_i + \beta_2 FSPT_{ji} + \beta_3 CPI_i + \beta_4 COLA + \beta_5\ Unemployment_i + \Sigma_{j=6}\ \beta_j Industry_i.$$

We expect the negotiated rate of growth in wage to:

- decrease with an increase in general payroll tax ($\beta_1 < 0$);

- decrease or increase with an increase in firm-specific payroll taxes ($\beta_2 = ?$)

- increase with an increase in prices as measured by the average annual inflation of the two previous quarters ($\beta_3 > 0$);

- be lower with the presence of a Cost Of Living Adjustment clause ($\beta_4 < 0$) since the collective agreement then provides protection against unexpected inflation;

- decrease with an increase in the unemployment rate ($\beta_{5'} < 0$);

- vary between industries to reflect various industry specific factors such as the strength of unions.

We present the variables in detail in the next part of the paper

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[4] Vaillancourt and Marceau (1990, 178).

2. Payroll taxes and data.

In this section the relevant Canadian payroll taxes are presented and the data used in the estimations summarized.

2.1 Canadian payroll taxes

Table 2 presents the main characteristics of the seven relevant payroll taxes.

Table 2

Payroll Taxes in Canada				
Type of Tax	Government Level	Who pays	Rate (%) 2007 QC	Rate (%) 2007 ON
Unemployment Insurance(UI)	Federal Government (1940)	58% Employers and 42% Employees	2.04	2,52
Canada/Quebec Pension Plan (C/QPP)	Federal and Quebec (1966)	50% Employers and 50% Employees	9,9	9,9
Workers Compensation (WCB)	All Provinces (1910+)	100% Employers	2,24*	2,26*
Health-Education Payroll Taxes (H/E)	Quebec (1970), Manitoba (1982), Newfoudland (1990), Ontario (1990)	100% Employers	4,26	1,95
Labour Standards (CNT)	Quebec (1979)	100% Employers	0,08	NA
Quebec Parental Insurance Plan (QPIP)	Quebec (2006)	58% Employers and 42% Employees	0,583	NA
Employer Training Tax	Quebec (1995)	100% Employers	1,00	NA

Source: Bédard, M. (1998), "A Primer on Payroll Taxes in Canada", Applied Research Branch Strategic Policy Human Resources Development Canada, R-98-7E, p10.

All rates are statutory except for the WCB ones which are the observed average NA Not Applicable

The date in ( ) is the date a program was introduced. All tax rates are set annually ;the CPP/QPP rate has been stable since 2000 and the employer training tax one since 1995

The following points are worth noting with respect to the content of Table 2:

- The unemployment insurance rate is not the same in Québec as in the rest of Canada since that province operates a distinct parental (leave) insurance plan. Hence the federal EI rate is reduced in Québec, leaving room for the payroll tax that finances the Québec plan;

- The federal Canada pension plan (for workers outside Québec) and its equivalent, the Québec pension plan, have contribution rates that are set independently but are in practice always equal;

- The WCB rates are set at the level of the sector taking into account at least partially experience rating;

- The health and education provincial payroll taxes are general payroll taxes with no earmarking of funds;

- The employer training tax is only levied by the government of Quebec on employers who do not provide training for their workers, the amount spent must exceed 1% of the total payroll in order to avoid the tax.

2.2 The data

We now present the variables used in the model[5]

Dependant variable W

It is the negotiated rate of wage growth for all collective agreements with more than 500 employees, which were signed in Quebec or Ontario during the period of 1985 to 2007. The data on the collective agreements were collected by Human Resources and Skills Development Canada. Figure1 presents the evolution of wage growth in Canada for the 1985-2007 period. The negotiated wage growth is higher for the collective agreements without cost of living clauses.

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[5] Additional information is found in the appendix.

Figure 1

The evolution of the negotiated wage growth 1985-2007.

Payroll taxes GPT, GPTB, GPTNB and FPST

We use either one or a combination of two variables for non firm specific payroll taxes. They are:

General payroll tax GPT= sum of the UI, CPP or QPP, HE, CNT and QPIP.

General payroll tax with benefits GPTB(1) = CPP or QPP;

General payroll tax without benefits GPTNB(1) = sum of UI, HE, CNT and QPIP;

General payroll tax with benefits GPTB(2) = sum of CPP or QPP and UI;

General payroll tax without benefits GPTNB(2) =sum of HE, CNT and QPIP;

Firm-specific payroll taxes FSPT= workers compensation premium by sector of activity. Average rates for the period are presented in an appendix table; they vary substantially between sectors.

The data on the UI, CPP, QPP, HE, CNT and QPIP were collected from published sources.[6] The workers compensation premiums of Quebec and Ontario were provided by the provincial

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[6] Treff and Perry (1985-2007).

workers compensation board (CSST and WSIB respectively) in a format allowing us to mach it to the wage data.

The employer training tax is excluded from the analysis for lack of data. We note that 91% of the employers which were subject to this tax in the period of 2000-2003 invested in employees training, 76% of the employers who invested in employee training invested more than 1% while 15% invested less than 1%.[7].

Figure 2
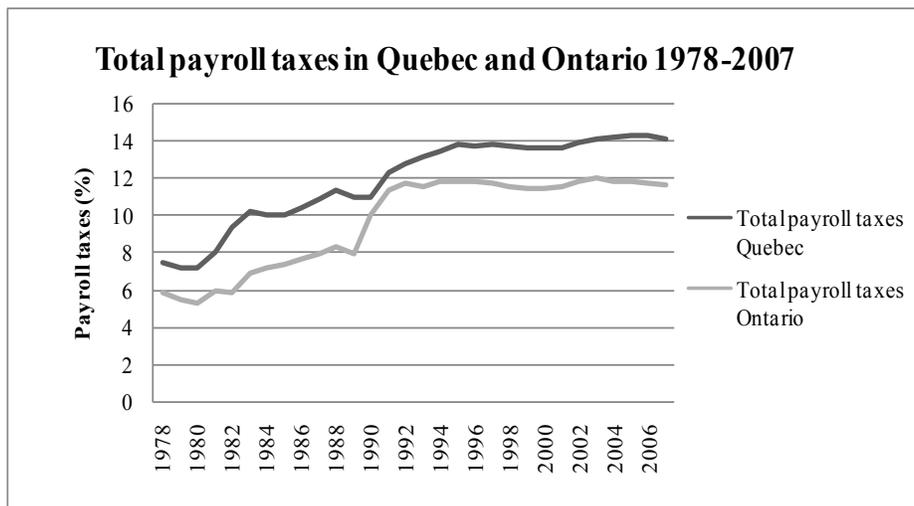
Source: calculations by the authors

Figure 2 presents the evolution of the total payroll taxes in Quebec and in Ontario for a period of time of 29 years. It shows a positive trend in the total employer payroll taxes in both provinces, with higher taxes in Québec.

Inflation CPI

The variable CPI is the average annual inflation in each province observed two quarters before the collective agreement was signed.

Cost of Living Adjustment COLA

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[7] http://emploiquebec.net/publications/pdf/00_fnfmo_rapport20002005.pdf

The variable COLA indicates the presence (1) or not (0) of an indexation clause in the collective agreement

Unemployment

The variable unemployment is the average unemployment rate in each province two quarters before the collective agreement.

Industry

We include 18 industrial dichotomous variables. Food and beverages is the reference industry. The list of sector is found in the appendix table where WCB rates are presented

Figure 3 shows that both inflation and unemployment reach their peaks in the early 90s in Quebec and Ontario.

Figure 3[8]

Evolution of the inflation and the unemployment in Quebec 1985-2007

Evolution of the inflation and the unemployment in Ontario 1985-2007
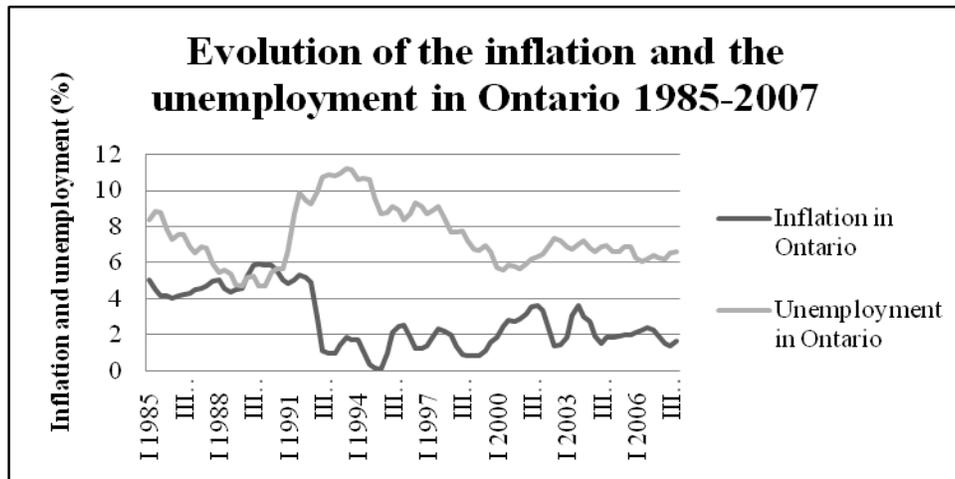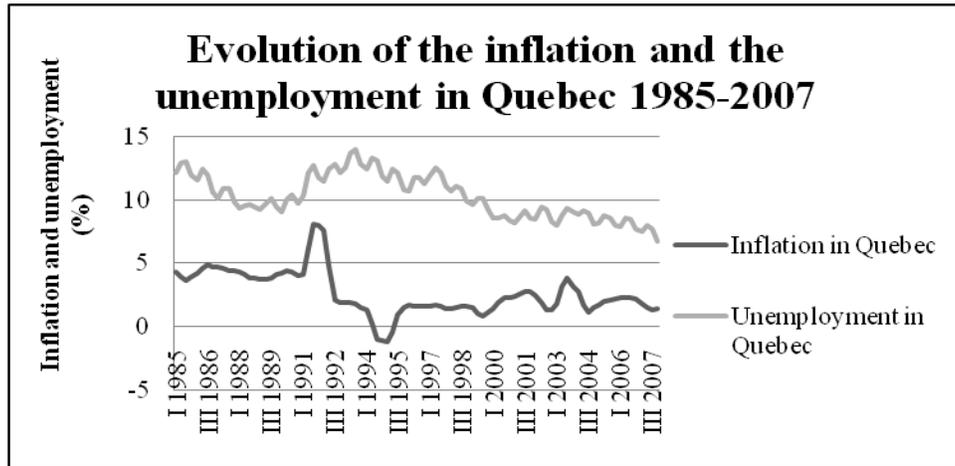
[8] The Graphic 3 is based on the following two sources:
1) Statistics Canada (2009), Labour force survey estimates (LFS), by sex and detailed age group, unadjusted for seasonality, monthly (persons unless otherwise noted), 1985-2003, Unemployment rate and the labour force, Quebec and Ontario, Table 282-0001.
2) Statistics Canada (2009), Consumer price index (CPI), 2005 basket, monthly (2002=100 unless otherwise noted), 1985-2007, Quebec and Ontario, Table 326-0020.

3. Results

We present the key results found in Roy- César (2009) for Québec and Ontario in table 3.

Table 3 Determinants of wage growth, Ontario and Québec, 1985-2007, three definitions of general payroll taxes,

Negotiated wage growth as the dependent variable.	Québec (1)	Québec (2)	Québec (3)	Ontario (4)	Ontario (5)	Ontario (6)
General Payroll taxes used	GPT	GPTB1	GPTB2	GPT	GPTB1	GPTB2
Constant	11,224	11,136	10,074	7,000	6,884	8,410
	(10,17)	(12,09)	(10,85)	(8,71)	(9,52)	(7,52)
General payroll tax	-0,515	--	--	-0,296	--	--
	(7,85)			(5,94)		
General payroll tax with benefits	—	-0,393	-0,804	—	-0,202	-0,510
		(5,76)	(5,10)		(3,32)	(3,85)
General payroll tax without benefits	—	-0,772	0,079	—	-0,506	-0,162
		(6,67)	(0,22)		(6,28)	(1,08)
Firm-specific payroll tax	0,062	0,048	0,030	0,227	0,209	0,140
	(1,72)	(1,36)	(0,83)	(5,76)	(4,80)	(3,26)
Inflation in the CPI	0,186	0,142	0,168	0,164	0,084	0,081
	(4,70)	(3,62)	(4,08)	(2,42)	(1,21)	(1,23)
Cost of living agreements	-0,676	-0,690	-0,698	-0,902	-0,908	-0,356
	(4,91)	(5,03)	(5,05)	(4,87)	(4,85)	(8,46)
Unemployment	-0,206	-0,149	-0,230	-0,296	-0,248	-0,938
	(6,25)	(3,17)	(6,94)	(8,10)	(5,86)	(5,09)
R^2	0,409	0,428	0,426	0,451	0,459	0,457
N	581	581	581	581	1291	1291

* t-statistics are in parentheses. Eicker-White robust standard errors were used to correct for heteroskedasticity.

Columns 1 and 4 present results for Québec and Ontario using a single general payroll taxes; columns 2 and 5 use one definition of general payroll taxes with benefits and columns 3 and 6 a

slightly more inclusive one. We do not include the results for the 18 sectors; they are available in Roy-César (2009)

Examining first the control variables we find that:

- An increase in inflation(CPI) increases the growth of wages, significantly so in four out of six equations;
- The presence of a cost-of-living adjustment clause reduces the negotiated rate of wage growth significantly so in all six equations. There is a trade-off between a guaranteed wage increase and protection against inflation;
- An increase in the unemployment rate reduces the growth of waged significantly so in all six equations.

So the three non sectoral control variables have their expected signs. Turning to the payroll taxes variables we find that:

- When we use a single measure of general payroll tax, we obtain a significant negative impact on wage growth with shifting of the order of 50% in Québec and 30% in Ontario;
- When we breakdown the general payroll taxes into benefits linked or not, we find using a narrow definition of benefits payroll tax(CPP/QPP) a smaller shifting of benefits linked payroll taxes than of non benefits linked ones, with all coefficients significant. But when we enlarge the notion of benefits to include unemployment coverage, this relationship no longer holds, that said, most coefficients are negative and significant, showing shifting of payroll taxes;
- Finally, an increase in firm specific payroll taxes, which represent an increase in the risk of a workplace accident, increases the rate of growth of wages, but significantly only in Ontario.

These findings are pretty similar to those obtained in Holmlund (1983), who used time series regression and found incidence of -0.462 and -0.492 after 1 year. They are also in agreement with those of Vaillancourt and Marceau (1990).

Conclusion

In this paper we use wage growth data from the collective agreements which covered more than 500 employees and were signed in Quebec or Ontario for the period of 1985-2007 to measure the incidence of payroll taxation in Canada. The results show that a one percentage point increase in general payroll tax reduces annualized wages growth by 1/2 of a percentage point in Quebec and 3/10 of a point in Ontario.[9] The estimations are similar to other estimations of the short-term incidence of general payroll tax found in the literature. Moreover, the results show that firm-specific payroll tax have a positive but not always significant impact on wages growth, which suggests that the upward pressure due to the need of a risk premium exceed the downward pressure on wage due to the firm-specific tax increase. These results suggest that in the short-term, an increase in general payroll tax has a negative impact on wage growth and since this impact is less than the amount of the tax these results also suggest a negative impact on employment.

These results were obtained for large employers. It would be useful to see if they hold for small ones. Given that employees in small firms are less likely to be unionized and thus have less bargaining power while their employers are more likely to be price takers than large firms, we would expect shifting to be even more pronounced in that setting.

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[9] We find similar results when the tax variables are lagged two years instead of one year, and for that reason we only report the impact of an increase in payroll tax after one year.

Appendix Tables

Variables definition and sources		
Variables	Definition	Source
W	The negotiated grown in base wage	Human Resources and Skills Development Canada
GPT (level)	The sum of the general payroll taxes = UI+CPP+HE+CNT (level)	Finances of the Nation - (1985-2007)
FSPT (level)	The sum of the firm-specific payroll taxes = WC (level)	CSST
CPI	The average annualized inflation two quarters before the collective agreement	Statistics Canada web site (CANSIM 326-0020).
COLA	Dichotomous that = 1 if there is a Cost of living agreement clause in the collective agreement and = 0 otherwise.	Idem W
Unemployment	The average unemployment rate two quarters before the collective agreement	Statistics Canada web site (CANSIM 282-0001).

Mean WCB rate(unweighted) by sector

Industries	Québec	Ontario
Food and beverages	6,35	3,87
Construction	18,45	7,89
Textile, clothing and leather	3,41	4,10
Wood products, paper and printing	8,46	2,27
Petroleum, coal and chemical products	1,97	1,40
Plastics and rubber products	4,08	4,26
Non-metallic mineral products	5,68	3,30
Primary metals	4,55	5,81
Metal products	3,65	3,87
Machinery	5,76	3,99
Computer and electronic	0,89	1,61
Electrical equipment and appliances	0,89	4,56
Transportation equipment	3,46	4,56
Wholesaler and distributors	2,53	2,01
Grocery stores	2,53	2,02
Transports	12,32	5,47
Broadcasting and telecommunications	0,66	0,68
Administrative and support services	0,55	3,80
Accomodation services	2,90	3,09
Total *	5,04	3,56

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