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Incidence of Taxes and Government Expenditures at the Sub-national level: evidence for Québec in 2007*

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INTRODUCTION

This paper studies the incidence of federal and provincial taxes and public expenditures for households residing in Québec in 2007 regrouped into ten deciles. Our results are of interest since: they present to readers a methodology that can be applied to study sub-national governments such as those of US states and add to the stock of knowledge of the incidence of taxes and public spending in North America. The paper is divided into three parts. The first summarizes the literature and present the data and income concept used. The second present the incidence of the taxes and expenditures while the third links them together to calculate the net fiscal benefit by decile. It discusses how to account for consumption tax credits found in the relevant PIT systems and how to account for provincial expenditures funded by federal transfers. Three appendices provide information on the income measure and the specific tax and expenditures assumption used and the associated data.

1. LITERATURE, DATA and INCOME CONCEPT

Literature

To our knowledge, the first study that examined the incidence of taxes in Canada was Gillespie (1964) for the Carter Commission. Among more recent studies we find Gillespie (1980) and Vermaeten, Gillespie and Vermaeten (1994). The latter offers a detailed analysis of the incidence of taxes in Canada for 1988 using the effective tax rates for different allocation scenarios.

At the provincial level, Payette and Vaillancourt (1986) are the first to evaluate the incidence of taxes and public expenditures. The absence of disaggregated data on the government expenditures for Canadian provinces and the direct recipients of transfer payments forced the authors to rely on general assumptions for the distribution of expenditures. Since these studies were undertaken, many parameters in the Canadian fiscal system have changed and data have become more available. Recent analysis of the incidence of taxes and public expenditures in Canada are limited and often abstract from the examination of provincial fiscal incidence. In this article, we first build up a comprehensive measure of household income, the broad income. Subsequently, we examine the distribution of taxes and public expenditures for households across ten income deciles and estimate the incidence of Quebec's fiscal system using the effective rates of taxes and expenditures. Moreover, we offer a general portrait of fiscal incidence in Quebec by evaluating the net benefits of public expenditures for households.

Data

Two main sources of data are used in our study: The first one is the Social Policy Simulation Database and Model (SPSD/M) of Statistics Canada, which is a compilation of data from the Survey of Labour and Income Dynamics (SLID), the Survey of Household Spending (SHS), Personal Income Tax Returns and the Employment Insurance (EI) claims. The SPSD/M helps us to allocate to households the aggregated federal and provincial consolidated government revenues and expenditures from the Financial Management System (FMS), our second source of data. This is used since the SPSD/M does not include information on taxes paid by businesses or on non-transfer spending that benefits households.

The statistical unit of our analysis is the household. Statistics Canada defines a household as “a person or group of persons who occupy the same dwelling and do not have a usual place of residence elsewhere in Canada or abroad...the household may consist of a family group such as a census family, of two or more families sharing a dwelling, of a group of unrelated persons or of a person living alone”¹. The SPSD/M contains 17,269 observations on households in Quebec weighted to yield Quebec’s population of 3,424,425 households. The households are then classified according to their money income (provided by SPSD/M) into income deciles. The number of households in the highest income decile is 37 percent (6,423 households) instead of 10 percent (1,727) and therefore overrepresented in the SPSD/M sample. This overrepresentation is beneficial for our study, since top income households have by definition the highest share of income and thus taxes in the population.

Our analysis of fiscal incidence is static and based on annual data for 2007, the most recent year for which data from SPSD/M and FMS were available at the time this research project was initiated. A dynamic alternative to the current methodology is the life-cycle approach, which evaluates the burden of taxes and the incidence of public spending over the entire life of households. This approach is not adopted here as this work was intended for policy makers operating in an annual budget cycle approach.²

Income concept

Past studies on the incidence of taxes and public expenditures have mainly used three measures of household income (Vermaeten et al., 1994): The pre-tax income, the broad income and the post-tax income. The pre-tax income is the sum of market income and other private financial sources of revenue without taking into account the role of

¹ Source: <http://www.statcan.gc.ca/concepts/definitions/house-menage-eng.htm>, Statistics Canada (page consulted on February 24, 2014).

² See Fullerton and Rogers (1991) for the comparison of the two approaches.

government to redistribute income; the broad income is the pre-tax income plus the public transfers; the post-tax income is the most comprehensive income concept, which includes, in addition to the broad income, the sum of government supplied goods and services after deducting taxes.

We chose the broad income concept to measure households' income in Quebec. The money income in SPSD/M comprises money income thus including the market income from households, i.e. the income from employment, investments and pensions, and federal and provincial transfers to households. To derive the broad income as defined previously in the literature (see for instance Gillespie, 1980 and Vermaeten et al, 1994), other sources of income must be added to the market income. Such sources correspond to the employer-provided benefits, imputed rental income, tax exemptions for income in Registered Retirement Savings Plan (RRSP) and Registered Pension Plans (RPPs), accrued capital gains (the capital gains when realized are included in the market income), employer social contributions and inheritances and gifts. These additional sources of income provide services and social benefits to households, such as the imputed rental income for the owners of a dwelling and the employer-provided health insurance for employees. Moreover, following past literature on fiscal incidence, we assume that employers' contributions to the Employment Insurance (EI), Canada Pension Plan (CPP) or Quebec Pension Plan (QPP) and Quebec Parental Insurance Plan (QPIP) are shifted to the employees, and are therefore added to the employment income. One exception to this rule is the Workers' Compensations Fund that we believe the employers are not able to transfer to their employees. Therefore, we consider the contribution to this fund uniquely as a payroll tax, whereas other employers' contributions are included both in the employee income and payroll taxes.

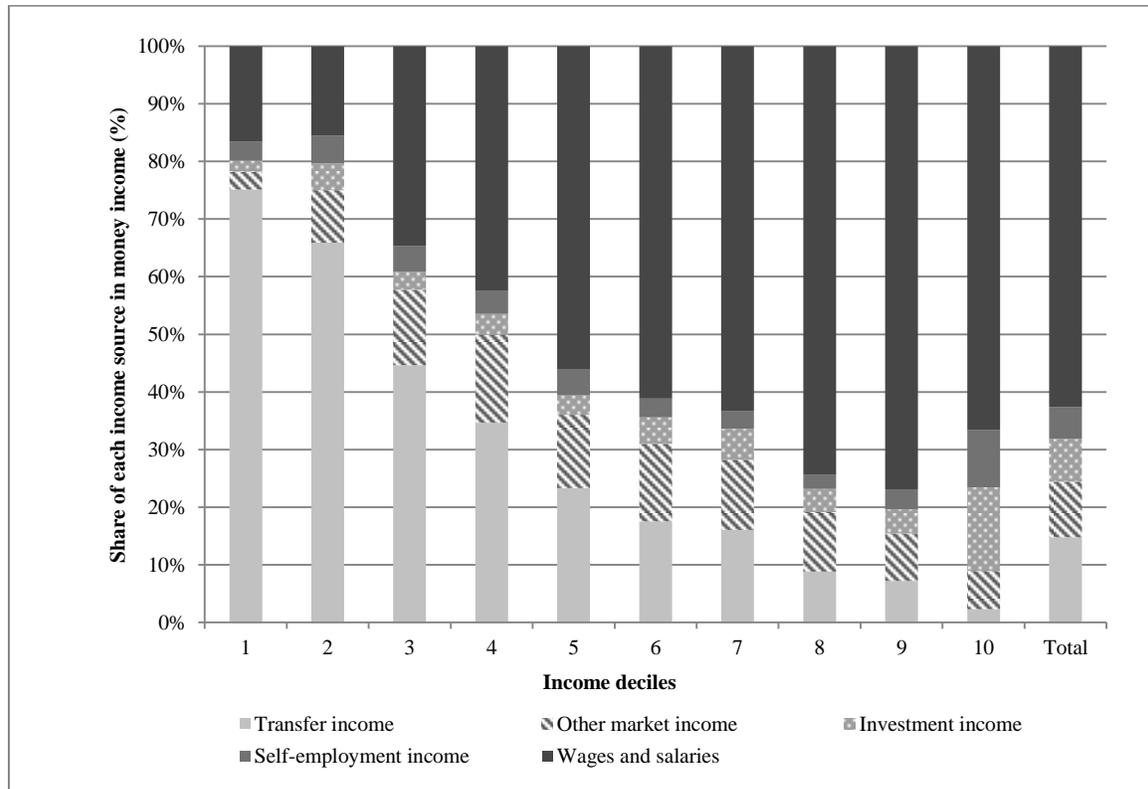
Household's Broad Income and Its Components

Money income accounts for the highest share of households' income. It consists of the market income and government transfers. The market income includes the wages and salaries, self-employment income, investment income and other sources of income (private pensions, support payments and other sources of taxable income). In total, wages and salaries hold the most important share of money income (63 percent). Transfer payments, which encompass both federal and provincial government transfers to individuals, are the second largest source of money income and are followed by other sources of market income. The average money income per household in Quebec was \$63,564 (Can) in 2007.

In order to examine the distribution of income and allocate taxes and public expenditures to households in Quebec, we classified households in deciles of money income. Figure 1 shows the importance of each component of money income for every decile. In this figure, we observe that the share of wages and salaries increase from the first decile to the

ninth decile. For the highest decile, this share decreases from the previous decile, but the self-employment and investment incomes are more significant than for other deciles.

Figure 1: Composition of Money Income, by Income Decile, Quebec, 2007

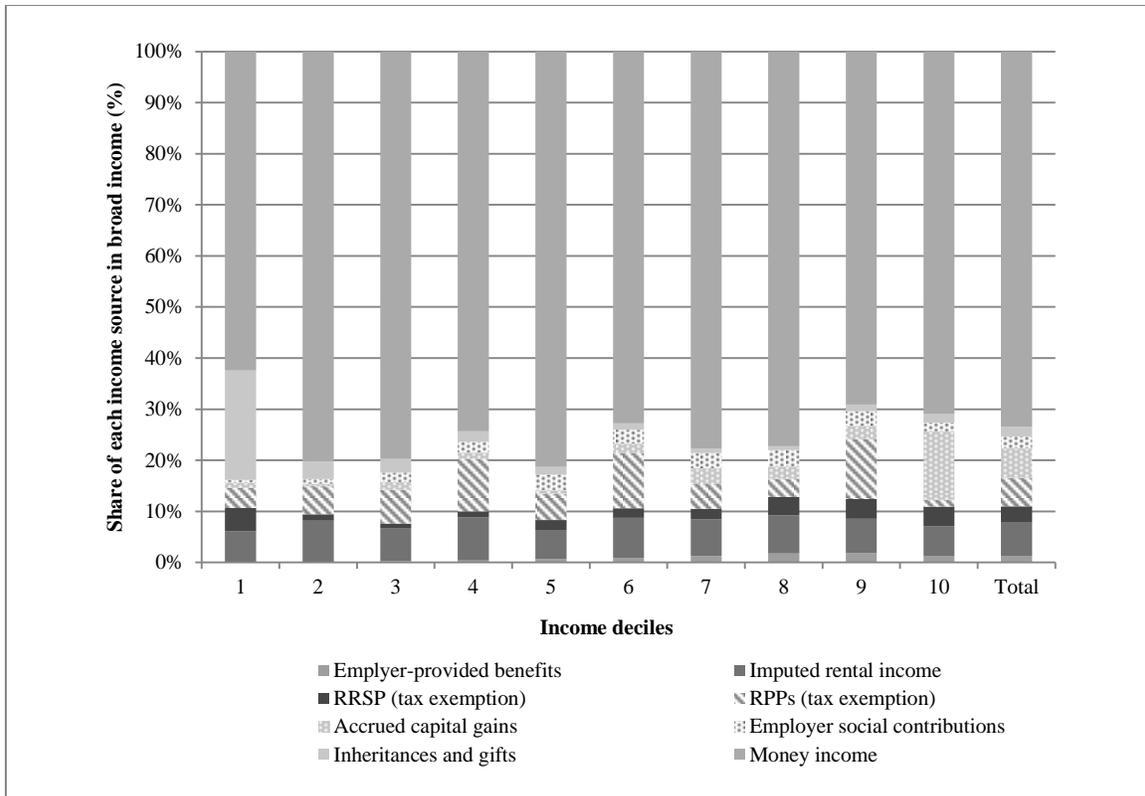


Source: SPSD/M, Statistics Canada and authors' calculations.

Although the money income is an important source of a household's income, it does not entirely capture all sources of household income. The money income is an incomplete measure of a household's purchasing power and her capacity to pay taxes. To correct this problem, additional sources of income must be added to the money income. Appendix A contains detailed explanations for each category of additional sources of income that constitute the broad income.

Figure 2 shows the different components of the broad income used in this study. We notice that the share of inheritances and gifts are more significant in the lowest decile in comparison to other income deciles while the highest decile benefits the most from capital gains.

Figure 2: Composition of Broad Income, by Income Decile, Quebec, 2007



Source: SPSPD/M, Statistics Canada and authors' calculations.

Table 1 presents the average households' money and broad incomes. The average broad income for the lowest and highest deciles is \$17,161 and \$281,194, respectively 60 percent and 41 percent higher than the average money income of the same deciles. It can be also noted that the share of the lowest decile in total broad income is 2 percent, whereas the highest decile holds 32 percent of the total broad income in Quebec. The average broad income for all the households is \$86,527, which is 36 percent higher than the money income.

Table 1: Money Income and Broad Income, in dollars, by income decile, Quebec, 2007

	1	2	3	4	5	6	7	8	9	10	Total
Money income	10,716	19,228	27,590	35,238	43,761	52,836	64,234	79,118	103,379	199,581	63,564
Broad income	17,161	23,958	34,584	47,409	53,819	72,592	82,586	102,433	149,580	281,194	86,527
Share of broad income (%)	2,0	2,8	4,0	5,5	6,2	8,4	9,5	11,8	17,3	32,5	100

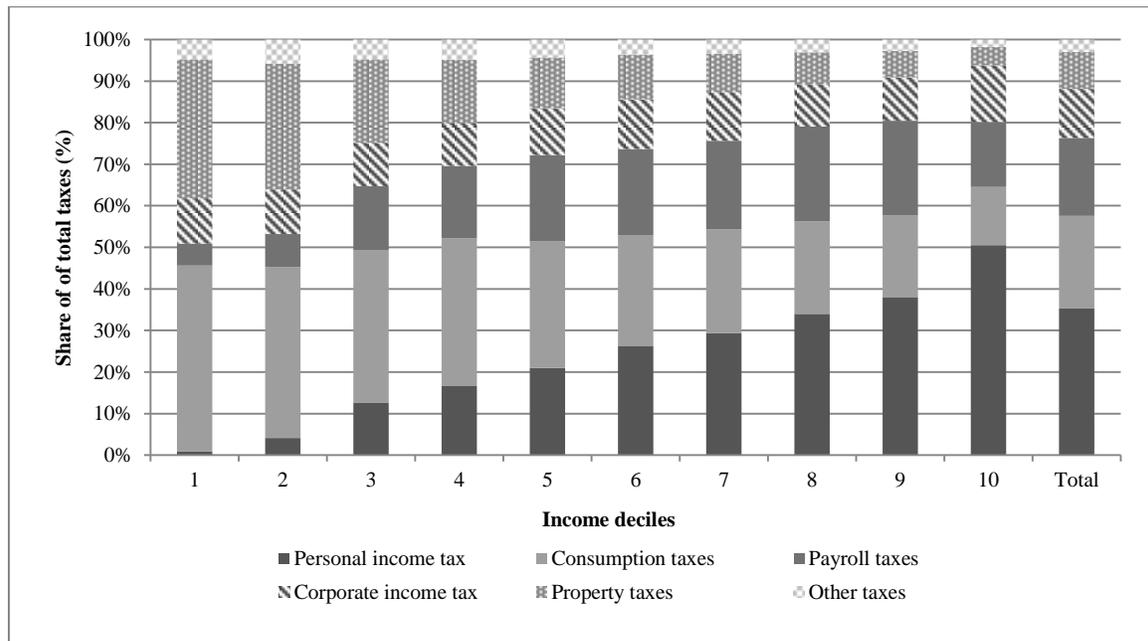
Source: SPSPD/M, Statistics Canada

2. INCIDENCE OF TAXES AND PUBLIC EXPENDITURES IN QUEBEC

In order to distribute the total federal and provincial tax revenues from FMS, we use an allocator in SPSD/M for each type of taxes. Appendix B describes and provides an explanation for the choice of each allocator.

Figure 3 presents the share of taxes by income deciles in Quebec. The diminishing share of consumption and property taxes from the lowest to highest deciles implies the regressive nature of these taxes. In fact, wealthier households' spend less on goods and services (as a percentage of their broad income) and therefore, consumption taxes require a lower share of their broad income.

Figure 3: Composition of Taxes, by Income Deciles, Quebec, 2007



Source: SPSD/M and FMS from Statistics Canada and authors' calculations.

In contrast, the personal income tax rises with household income. The increase in the share of wages and salaries (that do not benefit from a favorable tax treatment) in households' money income (figure 1) and the progressivity of PIT rates can explain this result.

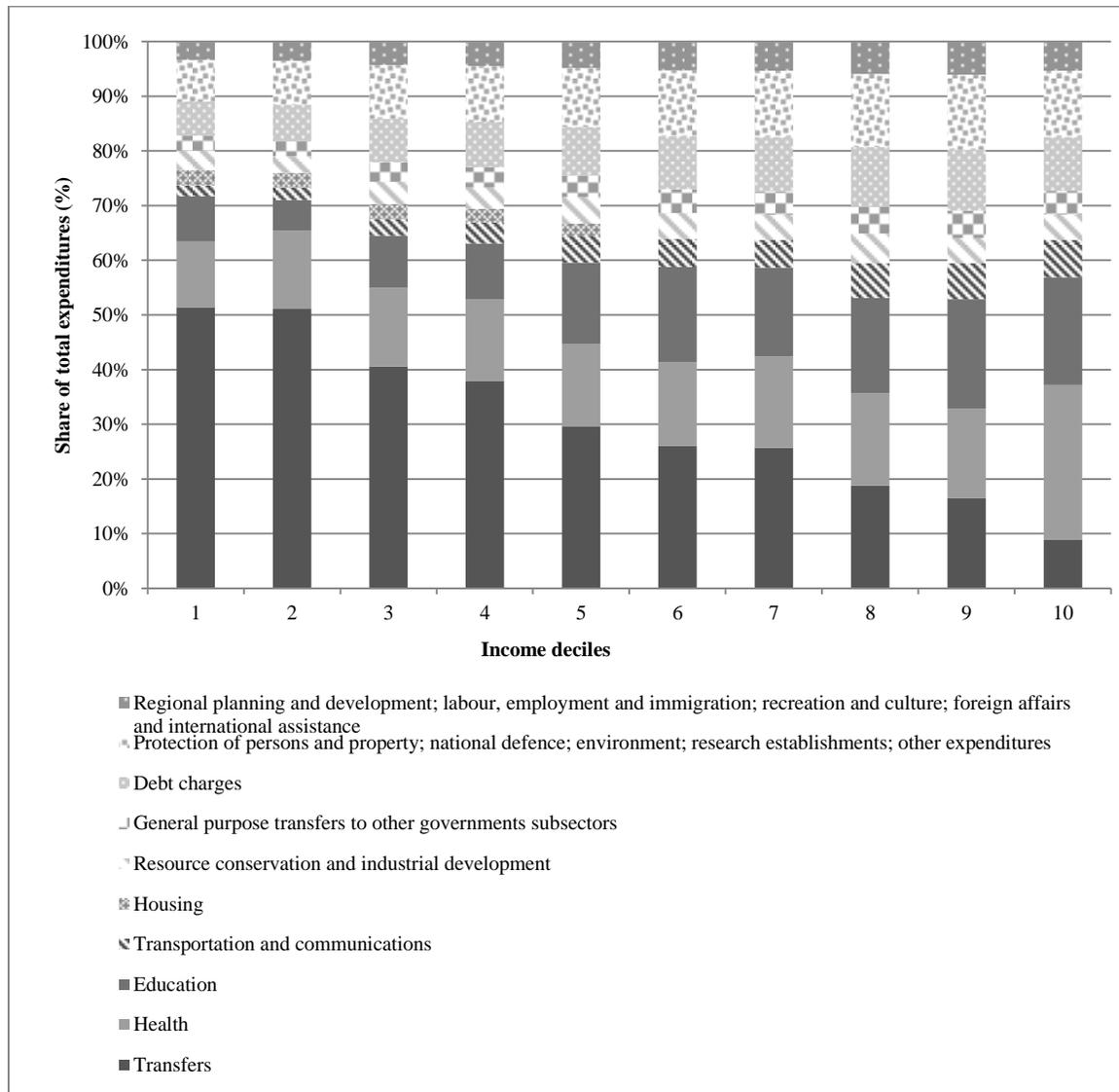
We have also examined the distribution of public expenditures across income deciles. Appendix C provides more details about the distribution method for public expenditures.

The share of benefits that each household receives from government spending varies according to whether we used the number of individuals in a household or the household broad income in the allocation of public expenditures.³ The attribution of expenditures

³ The allocation of expenditures to the number of individuals or the broad income applies to the following categories: Resource conservation and industrial development; Protection of persons and property, national defence, environment research establishments, other expenditures; Regional planning and development,

according to the number of individuals increases the share of total expenditures for low-income families, whereas the use of broad income shifts this share to high-income families; for instance, the share of the lowest decile in public expenditures drops from 30 to 10 percent when we change the allocation rule from the number of individuals to the broad income. Figure 4 and 5 present the distribution of the composition of total public expenditures in each income decile for the two alternative allocation rules.

Figure 4: Composition of Federal and Provincial Public Expenditures, by Income Deciles, Allocation According to the Number of Individuals in a Household, Quebec, 2007



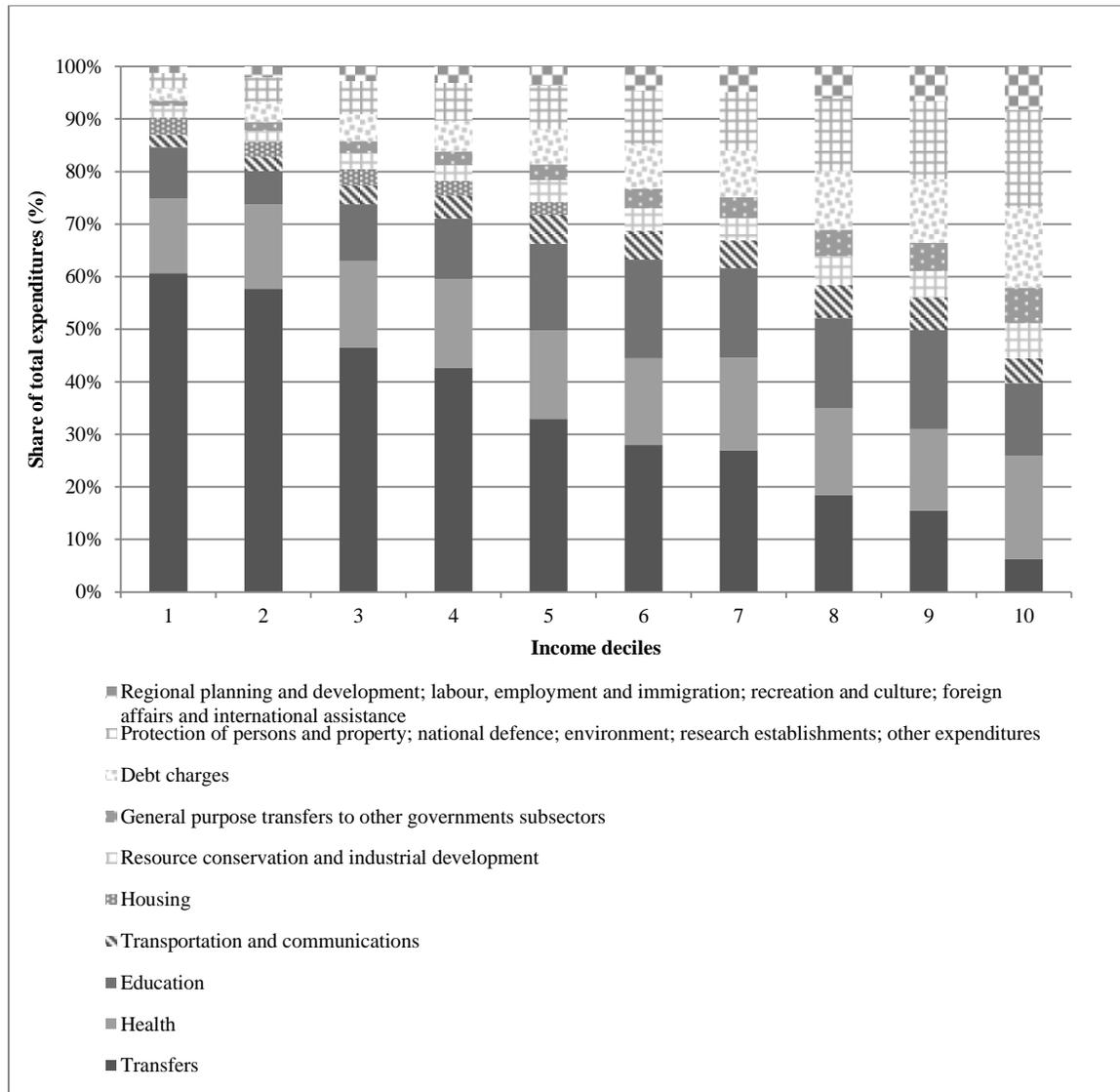
Source: SPSPD/M and FMS from Statistics Canada and authors' calculations.

In both figures, we observe that the share of transfers in total expenditures that households receive decreases as we move from the lowest to the highest deciles, as opposed to the share of education spending, particularly in figure 4. It can be also noted

labour, employment and immigration, recreation and culture, foreign affairs and international assistance; General purpose transfers to other governments subsectors; Debt charges.

the share of health expenditures remains almost constant for the first nine deciles and increases for highest decile according to both allocation rules.

Figure 5: Composition of Federal and Provincial Public Expenditures, by Income Deciles, Allocation According to the Household Broad Income, Quebec, 2007



Source: SPSPD/M and FMS from Statistics Canada and authors' calculations.

3. EFFECTIVE RATES FOR TAXES AND PUBLIC EXPENDITURES

We now turn to the examination of effective rates for the various categories of taxes and public expenditures, distinguishing between federal and provincial taxes and spending. An effective rate is the ratio of paid taxes or public expenditures received to broad income. A tax (expenditure) has a progressive incidence when its effective rate increases (decreases) with households' income. In contrast, when it has a higher effective rate for low-income families than for higher income families, it has a regressive incidence. If the effective rate is the same for each income decile, then we attribute a proportional incidence to the tax or expenditure in question.

Effective Tax Rates

Personal Income Tax

Table 2 presents the effective tax rates for federal and provincial personal income tax (PIT). The share of PIT in households' broad income was on average 13 percent in Quebec. The study of effective tax rates for each decile highlights the progressive incidence of PIT on households, since low-income families in the first and second deciles paid respectively 0.3 and 1.3 percent of their income in taxes, whereas high-income families in the last decile paid 19.1 percent. We also observe that the provincial PIT has a higher progressivity than the federal PIT.

Table 2 – Effective Rates for Federal and Provincial Personal Income Tax (PIT), by Income Deciles, Quebec, 2007

	1	2	3	4	5	6	7	8	9	10	Total
Federal PIT	0,2	0,8	1,9	2,4	3,5	4,0	4,7	5,8	5,8	8,6	5,7
Provincial PIT	0,1	0,6	2,2	3,1	4,9	5,6	6,6	7,9	7,9	10,5	7,4
Total	0,3	1,3	4,1	5,5	8,3	9,6	11,3	13,7	13,7	19,1	13,1

Source: SPSPD/M and FMS from Statistics Canada and authors' calculations.

Consumption Taxes

The effective tax rates for consumption taxes are presented in table 3. This table shows that both federal and provincial consumption taxes are regressive, i.e. their share in household broad income decrease with the increase in income from one decile to another. The households in the first decile, who earned on average \$17,161 dollars in 2007, paid 14.5 percent of their income in consumption taxes, while higher income families, for instance those in the last decile with an average income of \$281 194 paid 5.3 percent of their income in CT taxes. These families had a CT effective rate of 3 percent lower than the average 8.3 percent effective rate for all the households in Quebec.

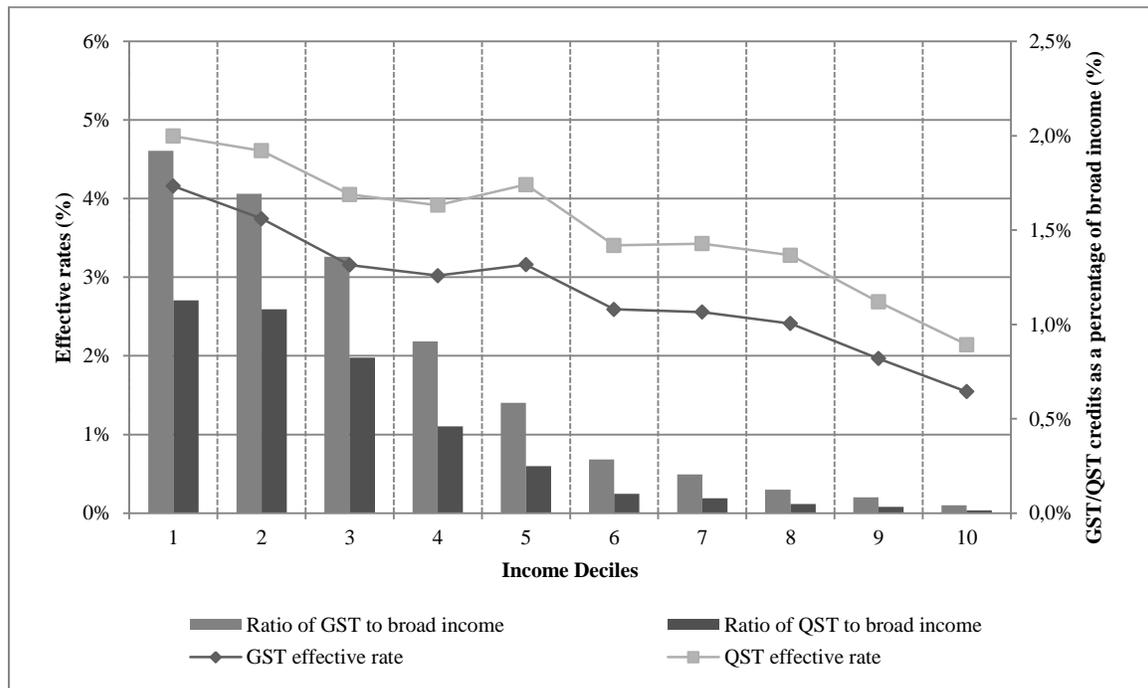
Table 3 – Effective Rates for Federal and Provincial Consumption Taxes (CT), by Income Deciles, Quebec, 2007

Type de taxes	1	2	3	4	5	6	7	8	9	10	Total
Federal CT	6,0	5,1	4,5	4,5	4,6	3,8	3,8	3,5	2,8	2,1	3,2
Goods and Services Tax (GST)	4,2	3,7	3,2	3,0	3,2	2,6	2,6	2,4	2,0	1,5	2,3
Other Taxes	1,8	1,4	1,4	1,5	1,5	1,2	1,2	1,1	0,9	0,6	1,0
Provincial CT	8,6	7,9	7,6	7,1	7,5	6,0	5,9	5,5	4,2	3,1	5,0
Quebec Sales Tax (QST)	4,8	4,6	4,1	3,9	4,2	3,4	3,4	3,3	2,7	2,1	3,0
Other Taxes	3,8	3,3	3,5	3,2	3,3	2,6	2,4	2,2	1,5	1,0	2,0
Total	14,5	13,0	12,1	11,6	12,1	9,8	9,6	9,0	7,1	5,3	8,3

Source: SPSPD/M and FMS from Statistics Canada and authors' calculations.

Both the federal and provincial income tax systems are used to provide households with a refundable income linked consumption tax credit. It is thus relevant to see how it interacts with the GST or QST. Figure 6 shows the relation between GST and QST credits and effective sales tax rates. Despite the higher share of those credits in the broad income of low-income families, both federal and provincial sales taxes have a regressive incidence on households in Quebec.

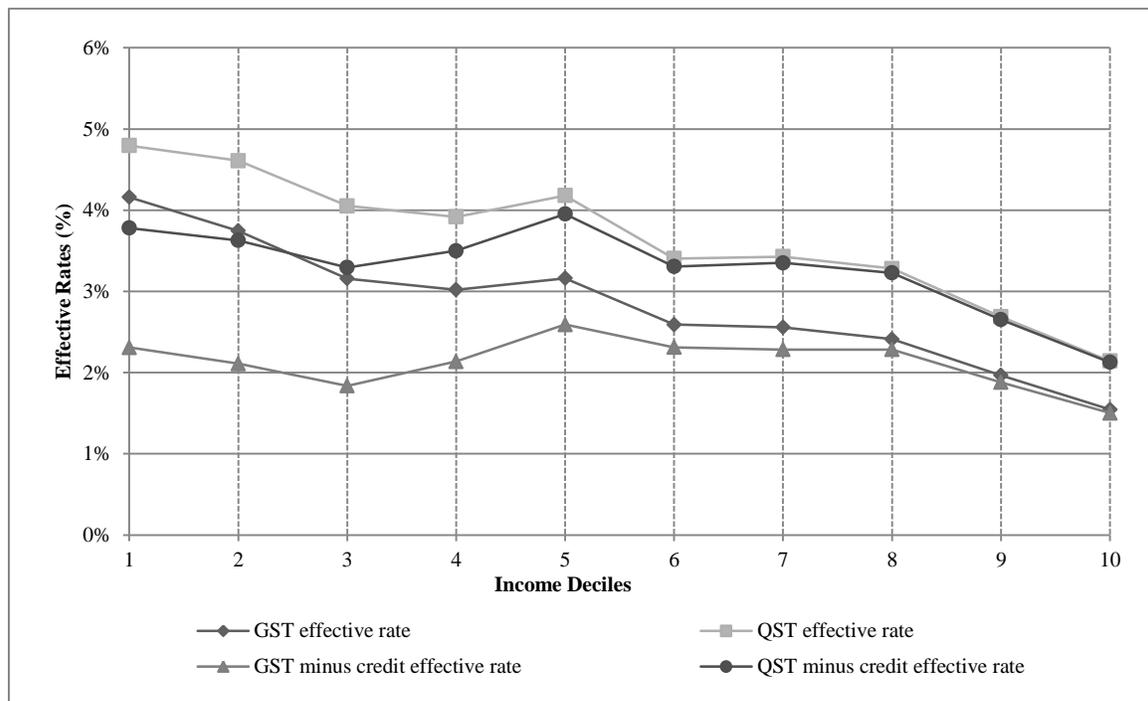
Figure 6: Effective Rates for GST/QST and the Ratio of GST/QST Credits to Broad Income, by Income Deciles, Quebec, 2007



Source: SPSPD/M and FMS from Statistics Canada and authors' calculations.

There is an alternative method of estimating the effective rates for GST/QST, which consists of subtracting the amounts of GST/QST credits from households' income and subtracting them from the GST/QST taxes paid by the households. As presented in figure 7, this method reduces the regressive incidence of sales taxes, especially for the low-income families, but does not eliminate it completely.

Figure 7: Effective Rates for GST/QST With and Without Credits, by Income Deciles, Quebec, 2007



Source: SPSD/M and FMS from Statistics Canada and authors' calculations.

Corporate Income, Payroll, Property and Other Taxes

The effective rates for corporate income, payroll, property and other taxes are presented in table 4. The incidence of corporate income tax (allocated 1/3rd each according to labour income, consumption and capital income) is rather proportional, if we abstract from its effect on the fifth and last deciles. In contrast, the property tax is clearly regressive, in particular for the first four deciles. The payroll tax is progressive from the first to the fifth decile, but has a regressive incidence for the last three deciles. This result can be explained by the proportionality of payroll taxes to the relevant taxable payroll up to a maximum threshold, as defined in federal and provincial tax laws.

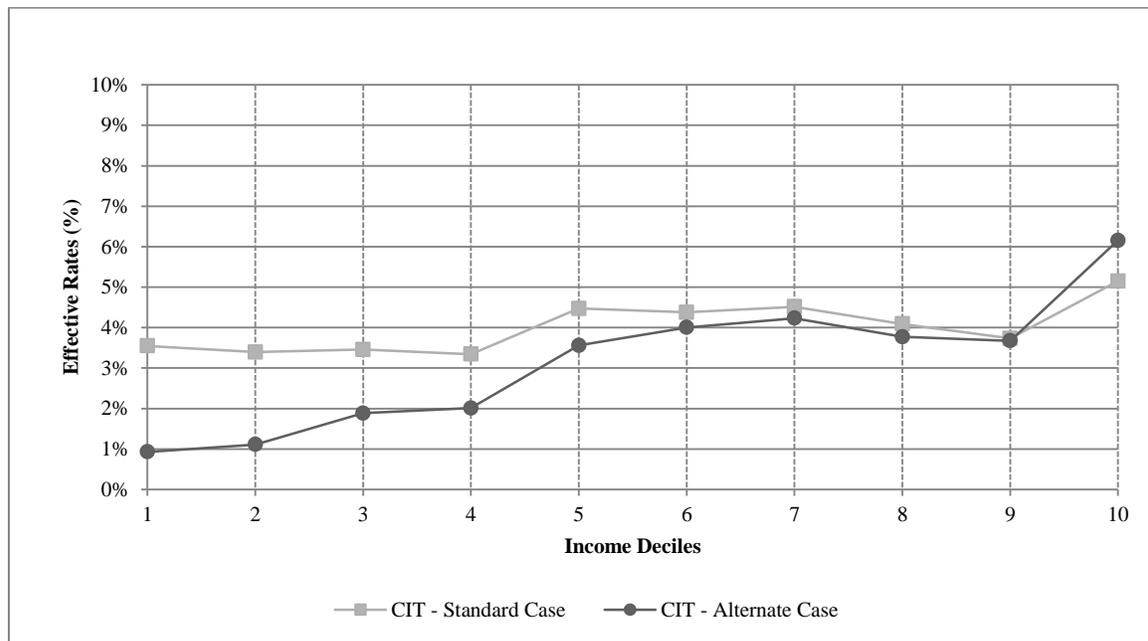
Table 4: Effective Rates for Corporate Income, Payroll, Property and Other Taxes

	1	2	3	4	5	6	7	8	9	10	Total
Payroll taxes	1,7	2,5	5,0	5,7	8,3	7,6	8,2	9,2	8,2	5,9	7,0
Corporate income tax	3,5	3,4	3,5	3,3	4,5	4,4	4,5	4,1	3,7	5,1	4,4
Property tax	10,9	9,6	6,6	5,0	4,8	4,0	3,6	3,1	2,3	1,7	3,3
Other taxes	1,5	1,8	1,6	1,6	1,7	1,3	1,3	1,2	1,0	0,7	1,1
Total	17,7	17,3	16,7	15,7	19,3	17,3	17,6	17,6	15,2	13,4	15,7

Source: SPSPD/M and FMS from Statistics Canada and authors' calculations.

Figure 8 shows the incidence of the corporation income tax according to two alternate allocation rules. In the standard case, the effective rates (also shown in table 4) are calculated based on the equal distribution of the burden of this tax between the consumers, workers and investors, whereas the alternate case supposes that only workers and investors bear the fiscal burden of CIT. This figure illustrates the sensitivity of CIT incidence to the use of the allocation rule, since the alternate case has a more progressive incidence on low-income households than the standard case.

Figure 8: Effective Rates for Corporation Income Tax (CIT), According to Two Alternate Scenarios, by Income Deciles, Quebec, 2007



Source: SPSPD/M and FMS from Statistics Canada and authors' calculations.

Total Taxes

The effective rates for all categories of taxes are presented in table 5. The average rate for households in Quebec is 37 percent. This table shows that the regressive incidence of consumption and other taxes is offset by the progressivity of personal income taxes both at the provincial and federal levels, therefore resulting in a progressive tax system in Quebec. Moreover, it can be noted that the effective rates for the first four deciles are lower than the total average rate, whereas the effective rates for the six higher deciles are close or above the average rate.

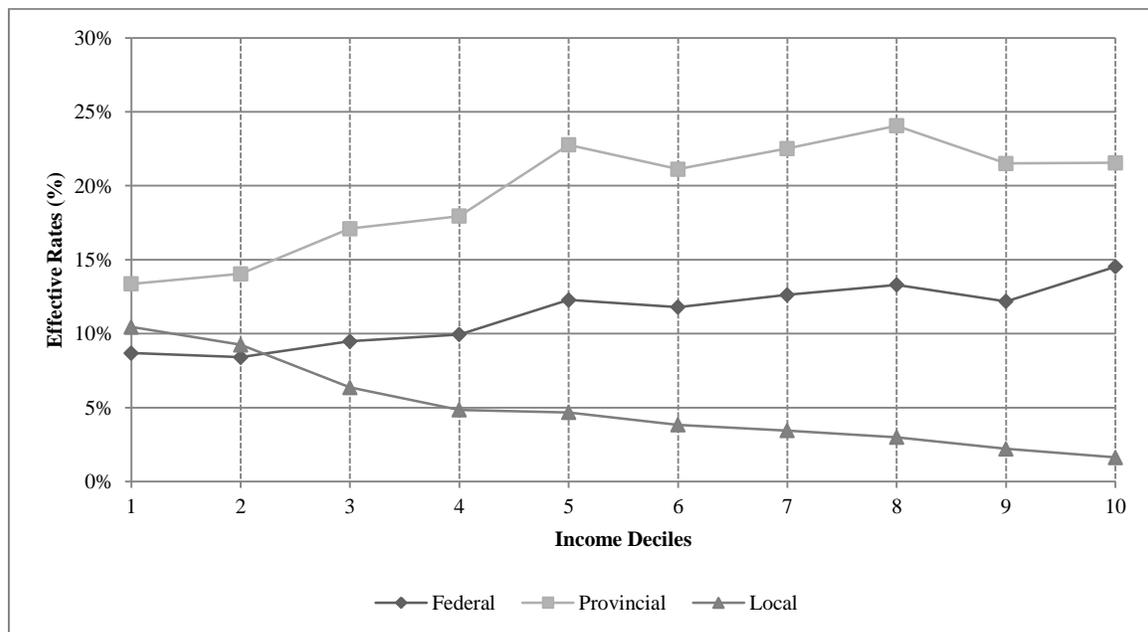
Table 5: Effective Rates for Total Taxes, by Income Deciles, Quebec, 2007

	1	2	3	4	5	6	7	8	9	10	Total
Personal income tax	0,3	1,3	4,1	5,5	8,3	9,6	11,3	13,7	13,7	19,1	13,1
Consumption taxes	14,5	13,0	12,1	11,6	12,1	9,8	9,6	9,0	7,1	5,3	8,3
Other taxes	17,7	17,3	16,7	15,7	19,3	17,3	17,6	17,6	15,2	13,4	15,7
Total	32,5	31,7	32,9	32,7	39,7	36,7	38,6	40,4	35,9	37,7	37,1

Source: SPSPD/M and FMS from Statistics Canada and authors' calculations.

In figure 9, the incidence of total taxes by the level of government is presented. Provincial taxes have the most progressive and local taxes the most regressive incidence on households in Quebec.

Figure 9: Effective Rates for Total Taxes, by the Level of Government and Income Decile, Quebec, 2007



Source: SPSPD/M, Statistics Canada and authors' calculations.

Effective Public Spending Rates

Transfer Payments

Transfer payments are the most important source of public spending in Québec in 2007; they represent 29 percent of total expenditures. Table 6 presents the effective rates for transfer payments for different levels of government. Transfer payments from both the federal and the provincial and local governments are progressive. This table also shows that the share of transfer payments in families' broad income is on average 13.3 percent.

Table 6: Effective rates for Transfer Payments, by Level of Government and Income Deciles, Quebec, 2007

	1	2	3	4	5	6	7	8	9	10	Total
Federal	23,6	29,5	20,9	12,8	9,4	6,1	5,6	3,0	2,0	0,7	5,4
Provincial and local	69,4	40,1	20,5	18,4	13,5	7,8	7,8	4,3	3,0	1,0	7,9
Total	93,0	69,6	41,4	31,2	22,9	13,9	13,4	7,3	5,1	1,7	13,3

Source: SPSPD/M and FMS from Statistics Canada and authors' calculations.

Health

Government expenditures for health services is the second source of public spending in Quebec and accounts for 17 percent of total expenditures. The provincial government is responsible for 98 percent of health expenditures.

The effective rates for health services represent on average 7.8 percent of families' broad income and have a progressive incidence for households in Quebec, as shown in table 7.

Table 7: Effective rates for Health, by Level of Government and Income Deciles, Quebec, 2007

	1	2	3	4	5	6	7	8	9	10	Total
Federal	0,3	0,2	0,2	0,2	0,2	0,1	0,1	0,1	0,1	0,1	0,1
Provincial and local	21,4	19,1	14,5	12,1	11,4	8,0	8,6	6,4	5,0	5,2	7,7
Total	21,7	19,4	14,7	12,3	11,6	8,2	8,7	6,5	5,1	5,3	7,8

Source: SPSPD/M and FMS from Statistics Canada and authors' calculations.

Education

The third most significant source of government expenditures is education, which consists of 15 percent of total expenditures. In Quebec, provincial and local governments are responsible for 94 percent of these expenditures. Federal government spending on education consists of funding for research in universities and workers' retraining. Table 8 presents the effective rates for education.

Table 8: Effective rates for Education, by Level of Government and Income Deciles, Quebec, 2007

	1	2	3	4	5	6	7	8	9	10	Total
Federal	1,1	0,8	0,7	0,6	0,7	0,5	0,5	0,4	0,3	0,2	0,4
Provincial and local	13,9	6,9	8,9	7,8	10,8	8,8	8,0	6,3	5,8	3,5	6,3
Total	15,0	7,6	9,7	8,4	11,5	9,3	8,5	6,8	6,2	3,7	6,7

Source: SPSPD/M and FMS from Statistics Canada and authors' calculations.

The number of children, who attended primary and secondary schools, in addition to the number of young adults, who are enrolled in college and universities, for each household can explain the variation of effective rates across income deciles in table 8. In fact, from the fifth to the sixth decile, the number of children in schools increases by 66 percent and the number of months of full-time study in a post-secondary institution decreases by 60 percent. Government expenditures for primary and secondary schools and post-secondary schools correspond to 90 percent of total public spending in education.

Total Expenditures

Table 9 presents the effective rates for federal, provincial and local governments total expenditures in Quebec. As shown in this table, we use two allocators to distribute some of the public spending across the income deciles. The effective rates show that provincial and local expenditures account for a highest share in households' income than the federal expenditures. It can also be noted that the incidence of government expenditures is progressive for all levels of government. This progressivity is more significant for provincial-local than for the federal government, in particular for the first three deciles.

Table 9: Effective rates for Total Government Expenditures, by Level of Government and Income Deciles, according to Two Alternate Allocation Rules, Quebec, 2007

	1	2	3	4	5	6	7	8	9	10	Total
Federal											
Allocator: Individuals	47,5	47,1	37,0	26,0	23,0	15,5	14,7	10,7	8,0	4,1	13,3
Federal											
Allocator: Income	35,7	40,6	31,5	22,0	19,7	13,9	13,7	11,0	8,8	7,5	13,3
Provincial and local											
Allocator: Individuals	133,4	88,9	64,9	56,3	54,2	38,0	37,5	28,1	22,8	14,6	33,0
Provincial and local											
Allocator: Income	117,5	80,1	57,5	51,0	49,7	35,8	36,0	28,5	23,9	19,3	33,0
Total											
Allocator: Individuals	180,9	136,1	101,9	82,3	77,2	53,5	52,2	38,8	30,9	18,7	46,2
Total											
Allocator: Income	153,2	120,6	89,1	73,1	69,4	49,7	49,7	39,5	32,7	26,8	46,2

Source: SPSPD/M and FMS from Statistics Canada and authors' calculations.

We have considered until now that the transfers from the federal to the provincial government finance provincial expenditures. An alternate hypothesis is to allocate these transfers to the federal government expenditures. Such adjustment can be justified on the grounds that we are interested in the analysis of taxes versus expenditures for each level

of government. In order to adjust the federal expenditures to take into account its transfers to Quebec's provincial government, we build provincial adjustment ratio as follows:

$$\text{Provincial adjustment ratio} = \frac{\text{Total provincial expenditures} - \text{Transfers}}{\text{Total expenditures}}$$

We use the same method than (1) to adjust federal government expenditures for transfers, however by adding instead of subtracting the transfers to the total federal expenditures as shown below:

$$\text{Federal adjustment ratio} = \frac{\text{Total federal expenditures} + \text{Transfers}}{\text{Total expenditures}}$$

We then multiply these ratios by the provincial and federal governments' expenditures respectively in order to obtain the adjusted expenditures for each level of government. The adjusted effective rates are then computed using the provincial and federal adjusted expenditures:

$$\text{Effective adjusted rate}_i = \frac{\text{Adjusted expenditures}_i}{\text{Broad income}}$$

where $i = \text{federal, provincial}$

Table 10 shows the effective adjusted rates for total transfer adjusted expenditures; not surprisingly, the federal share has increased compared to table 9.

Table 10: Adjusted Effective Rates for Total Expenditures, by Level of Government and Income Deciles, according to Two Alternate Allocation Rules, Quebec, 2007

	1	2	3	4	5	6	7	8	9	10	Total
Federal											
Allocator: Individuals	63,4	62,9	49,4	34,7	30,7	20,6	19,7	14,2	10,7	5,4	17,7
Federal											
Allocator: Income	47,6	54,1	42,1	29,4	26,2	18,5	18,2	14,6	11,8	10,0	17,7
Provincial and local											
Allocator: Individuals	115,4	77,0	56,2	48,8	46,9	32,9	32,4	24,4	19,8	12,7	28,5
Provincial and local											
Allocator: Income	101,7	69,3	49,8	44,2	43,0	31,0	31,2	24,7	20,7	16,7	28,5
Total											
Allocator: Individuals	178,8	139,9	105,6	83,4	77,6	53,5	52,1	38,6	30,5	18,1	46,2
Total											
Allocator: Income	149,3	123,4	91,9	73,6	69,2	49,5	49,4	39,3	32,5	26,7	46,2

Source: SPSPD/M and FMS from Statistics Canada and authors' calculations.

Net Spending Effective Rates

Once we allocated taxes and expenditures by income deciles, we can proceed to the estimation of net benefits that households receive from the government in Quebec. The

net benefits consist of the gross benefits, i.e. government expenditures, minus the cost of those benefits, i.e. the taxes paid to the government.

Table 11 shows the effective rates for the net benefits of federal and provincial government expenditures. The net benefits represent on average 9.1 percent of households' broad income and are generally progressive for all levels of government. In other words, households in Quebec receive more benefits from their governments than the costs they incur to finance those benefits. Two factors can explain this result: First, some categories of government revenues were not included in our analysis. Second, Quebec is a net beneficiary of federal spending and thus pays less tax in comparison to benefits it receives from the federal government, particularly because of fiscal equalization payments.

Table 11: Effective Rates for Net Total Benefits, by Level of Government and Income Deciles, according to Two Alternate Allocation Rules, Quebec, 2007

	1	2	3	4	5	6	7	8	9	10	Total
Federal											
Allocator:											
Individuals	38,8	38,7	27,5	16,0	10,7	3,7	2,1	-2,6	-4,2	-10,4	0,6
Federal											
Allocator: Income											
Individuals	27,0	32,1	22,1	12,1	7,4	2,1	1,0	-2,3	-3,4	-7,0	0,6
Provincial and local											
Allocator:											
Individuals	109,6	65,7	41,4	33,5	26,8	13,1	11,5	1,1	-0,9	-8,6	8,5
Provincial and local											
Allocator: Income											
Individuals	93,7	56,8	34,1	28,2	22,3	10,9	10,1	1,5	0,2	-3,9	8,5
Total											
Allocator:											
Individuals	148,4	104,4	69,0	49,6	37,5	16,7	13,6	-1,6	-5,0	-19,0	9,1
Total											
Allocator: Income											
Individuals	120,7	88,9	56,1	40,3	29,6	13,0	11,1	-0,9	-3,1	-10,9	9,1

Source: SPSPD/M and FMS from Statistics Canada and authors' calculations.

CONCLUSION

This study examined the incidence of taxes and public expenditures in Quebec for 2007. Based on the distribution of taxes and public expenditures across households grouped in ten income deciles, our results indicated that the progressivity of personal income tax prevails over the regressive incidence of consumption and other taxes. For government expenditures, the transfers and health expenditures, which are the most important sources of expenditures, have also contributed to the progressivity of Quebec fiscal system, thereby reducing the gap between the low-income and the high-income families. Furthermore, the combination of effective rates for taxes and public expenditures show that the overall fiscal system in Quebec is progressive.

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APPENDIX A – DERIVATION OF BROAD INCOME

In this section, we present the five categories of income added to money income for deriving household broad income. Table A displays the distribution of these additional sources of income.

Employer-provided Benefits

This category includes fringe benefits provided by the employers to their employees, such as supplementary health, dental and medical insurances. These benefits increase the financial capacity of employees who receive them and must be added to their broad income.

The sum of guaranteed and non-guaranteed insurance premiums paid to private insurance companies was 5,771 million dollars for 2007 in Quebec. In a non-guaranteed plan, the employer is in charge of paying the premiums for his employees, whereas in a guaranteed plan, the unions or professional associations to which the employees could have contributed may also pay for premiums. Since an employee's contribution to his own insurance plan cannot be considered as a fringe benefit, we allocated 100 percent of benefits from non-guaranteed plans and 80 percent from guaranteed plans to employees.⁴

Due to the absence of data on the amount of premiums paid by employers for each worker, we cannot distribute these premiums to households directly. We chose to distribute the employer-paid premiums according to employees' contribution to Registered Pension Plans (RPPs). An alternative allocation rule would have been to use the wages and salaries for each household. The RPPs are closely related to the supply of general employer-provided benefits and increase more than proportionally to wages and salaries; in fact, the ratio of RPPs contribution to money income is 0.1 percent for the lowest decile and 1.3 percent for the highest decile.

Imputed Rental Income

The imputed rental income corresponds to the hypothetical rent that the owners of a dwelling pay to themselves for occupying their property instead of renting it to a tenant. For instance, an owner who can rent his dwelling for \$1000 per month and pays \$400 of interests on his mortgage is assigned an imputed rent of \$600, since he is the owner (60%) and occupier (100%) of his dwelling at the same time. The SPSPD/M offers no data on imputed rental income but the data on owners' expenses on property (mortgage payments, co-ownership fees, property taxes, etc.) is available for each household.

To estimate the imputed rental income for the owners, we first computed the average value for the main residence of households for each decile based on Survey of Financial

⁴ This estimation is based on *Health Insurance in Canada – 2007* report published by the Canadian Life and Health Insurance Association. A common mistake in past studies of fiscal incidence in Canada is to consider both guaranteed and non-guaranteed plans as fringe benefits paid by employers, therefore overestimating these benefits since in this way we ignore the employees' contributions to these plans.

Security (SFS).⁵ We then subtracted the remaining amount of mortgage to be paid to creditors from the value of residences in order to estimate the net value of households' dwelling. Subsequently, we estimated the share of this net value for each decile in the total net value for all deciles and allocated the imputed rent to owner-occupiers of a dwelling accordingly.⁶ We choose the net value of dwellings instead of the gross value because we wish to estimate the amount of rent that an owner-occupier would have asked a tenant in the housing market if he had decided to rent his property. The mortgage payments are in fact a rent paid to the provider of mortgages in the form of interest payments.

Tax exemptions for Registered Retirement Savings Plan (RRSP) and Registered Pension Plans (RPPs)

In 2007, the value of assets for RRSP and RPPs has accrued respectively to 2,625 and 4,893 million dollars.⁷ The increase in the value of these assets can be considered as an additional source of investment income, but is not included in households' money income. The accrued income from RRSP and RPPs are distributed according to the share of investments in each income decile in the total RRSP investments; the accrued income in RPPs are distributed based on households' holdings of registered retirement income funds.

Accrued capital gains

The sum of taxable and non-taxable capital gains in Quebec for 2007 was 4,919 million dollars⁸. The realized capital gains are included in households' investment income and are accounted in the market income. This is not the case for accrued capital gains. We multiply the realized capital gains in 2007 by 2.52 points, i.e. the historical rate of return for the Canadian stock market proposed by Vermaeten, Gillespie and Vermaeten (1994) in order to estimate the accrued capital gains. The SPSD/M provides us with the realized capital gains for each representative household.

Employer social contributions, inheritances and gifts

Employer social contributions consist of contributions to the Employment Insurance (EI), the Canada Pension Plan (CPP) and Quebec Pension Plan (QPP), in addition to the Quebec Parental Insurance Plan. Furthermore, we include inheritances and gifts, which are not accounted in households' money income, in the calculation of broad income.

⁵ The most recent year of SFS at the time we undertook this study was 2005. We assumed that the proportion of the net values of residences in Quebec for each decile remained unchanged from 2005 to 2007.

⁶ Institut de la statistique du Québec has provided us with the total amount of imputed-rent income for all households in Quebec: *Dépenses personnelles en loyers, Québec et autres provinces, 1981-2008, Institut de la statistique du Québec*.

⁷ *Dépenses fiscales – Éditions 2009*, Publications du ministère des Finances du Québec, 2009. We multiply the tax expenditures by five in order to convert those gains in savings, since the median statutory tax rate for personal income in Quebec for 2007 was close to 20 percent (or 1/5).

⁸ Source: *Statistiques fiscales des particuliers – Année d'imposition 2007*, Ministère des Finances du Québec Publications, 2010.

Table A: Households' Broad Income and Its Components, Quebec, 2007

	1	2	3	4	5	6	7	8	9	10	Total
Money Income Thresholds	\$16,362 and less	\$16,362 to \$23,079	\$23,079 to \$31,518	\$31,518 to \$39,063	\$39,063 to \$48,232	\$48,232 to \$57,877	\$57,877 to \$70,444	\$70,444 to \$89,708	\$89,708 to \$119,487	\$119,487 and more	
Money Income	10,716	19,228	27,590	35 238	43 761	52 836	64 234	79 118	103 379	199 581	63 564
Market income	2,666	6 549	15 258	23 019	33 540	43 538	53 888	72 112	95 863	194 967	54 135
Transfer income	8,050	12 679	12 332	12 219	10 221	9 298	10 346	7 006	7 516	4 614	9 428
Non-money income	1 054	1 959	2 330	4 196	3 432	6 341	6 959	9 455	12 820	19 886	6 843
Employer-provided benefits	14	11	88	177	348	662	1 047	1 771	2 702	3 344	1 016
Imputed rental income	1 040	1 949	2 241	4 019	3 083	5 679	5 912	7 684	10 118	16 543	5 827
Additional income	1 616	1 723	3 098	6 001	4 155	10 515	8 292	9 744	27 178	52 049	12 437
RRSP (tax exemption)	776	303	311	527	1 049	1 347	1 670	3 706	5 723	10 843	2 625
RPPs (tax exemption)	678	1 313	2 275	4 876	2 764	7 883	4 040	3 608	17 629	3 848	4 893
Accrued capital gains	162	107	513	597	342	1 286	2 582	2 429	3 826	37 359	4 919
Other income	3 774	1 048	1 566	1 975	2 472	2 900	3 100	4 117	6 204	9 677	3 683
Employer social contributions	104	231	650	1 010	1 657	2 018	2 455	3 346	4 230	5 008	2 071
Inheritances and gifts	3 670	817	916	965	815	882	645	771	1 973	4 669	1 612
Broad income	17 161	23 958	34 584	47 409	53 819	72 592	82 586	102 433	149 580	281 194	86 527
Share of total broad income (%)	2,0	2,8	4,0	5,5	6,2	8,4	9,5	11,8	17,3	32,5	100

Source: SPSPD/M and FMS from Statistics Canada and authors' calculations.

APPENDIX B – INCIDENCE ASSUMPTION FOR TAXES

Table B shows each category of taxes used in this study. The personal income tax (PIT) is the most important source of tax revenues for federal and provincial governments.

Table B: Taxes, in million dollars, by Level of Government, Quebec, 2007

	Federal	Provincial and local
Personal income tax	16,948	21,877
Corporate income tax	7,494	4,048
Consumption taxes	9,624	14,868
Payroll taxes	-	4,897
Property and related taxes	-	11,090
Other taxes and contributions		
Total	47,614	124,559

Source: FMS, Statistics Canada

Based on tax shifting assumptions in past studies on fiscal incidence, in particular Vermaeten, Gillespie and Vermaeten (1994) and Payette and Vaillancourt (1986), the allocation of taxes is as follows:

Personal Income Tax (PIT)

We assume that the economic incidence of the PIT equals its legal incidence; in other words, the person who pays the PIT is the same person who is required to pay this tax by the law. This assumption is maintained for both federal and provincial PIT.

Corporate Income Tax (CIT)

The revenue from this tax for the federal government includes the tax on federal corporations' profits and natural resource taxes and licences. At the provincial level, the CIT consists of the tax on provincial corporations' profits, provincial capital taxes, natural resource provincial taxes and licences, in addition to the mining and logging taxes. The burden of CIT can fall either on holders of capital, workers and consumers. However, there is no consensus about the allocation of this burden to each of these categories.

We first divided the total amount of CIT from the Financial Management System (FMS) of Statistics Canada into three equal portions for capital, labour and consumption. Each portion is then allocated to every income decile according to households' share of dividends from Canadian corporations, wages and salaries, and consumption expenditures.

If we suppose that the holders of capital are mainly those who support the burden of the CIT, then this tax can have a progressive overall incidence since the holders of capital have generally a higher income than the average.

Consumption Taxes (CT)

In addition to Quebec Sales Tax (QST), provincial consumption taxes are provincial government administered taxes on gasoline and motive fuel, alcoholic beverages, tobacco, and amusement tax. We also consider realized profits from the provincial public monopolies for the sale of hard liquor and some wine and beer -Société des alcools du Québec (SAQ) - and for gambling (lottery, VLT, casinos) - Loto-Québec- as a form of consumption taxes. Federal consumption taxes are the goods and services tax (GST), amusement tax, custom duties, as well as excise duties and taxes.

There are two categories of consumption taxes: The first category consists of taxes that are directly paid by the consumers on the purchase of goods and services; such taxes are not included in the price of the exchanged product and are added at the time of the transaction. The second category corresponds to the indirect taxes, paid by firms on the purchase of their inputs and then shifted to consumers. By increasing the price of the output sold to consumers by an amount equal to the tax, firms can shift the burden of such taxes to consumers of their final products.

We used variables related to consumption taxes in SPSD/M to allocate aggregate data on consumption taxes provided from Statistics Canada Financial Management System (FMS).

Payroll Taxes

Payroll deductions include contributions from employees and employers to Canada Pension Plan (CPP), Quebec Pension Plan (QPP), Employment Insurance (EI) and Quebec Parental Insurance Plan (QPIP). In addition, employers must contribute to Workers' Compensation Fund (WCF). However, we assume that employers are unable to transfer these contributions to employees. Therefore, except for WCF, we have added to households' broad income all the contributions from the employers, presuming that employers transfer them entirely to employees by reducing their potential wages. Therefore, we assume that the workers support the entire burden of CPP, QPP, EI and QPIP contributions.

Property and related taxes

Property taxes consist of residential and non-residential property taxes. Related taxes are land transfer taxes, which are added to the residential property taxes and business taxes, considered as a non-residential property tax.

We divided residential property taxes between owners and tenants of properties according to the number of residences that each occupies. For the owners, residential property taxes are allocated to households based on the corresponding variable in SPSD/M and for the tenants, the distribution is based on the amount of paid rent. We assume that non-residential property taxes are shifted to consumers, in the same way as the indirect consumption taxes. Therefore, non-residential property taxes are allocated in terms of households' final consumption expenditures.

Other Taxes and contributions

This category includes revenues from motor vehicle licences, drug insurance premiums and miscellaneous taxes. The motor vehicle licences are attributed to households based on motor vehicle fuel expenditures of households for each income decile; drug insurance premiums are distributed according to household spending on health and accident insurances; miscellaneous taxes are assigned to households based on final consumption expenditures.

APPENDIX C – INCIDENCE ASSUMPTION FOR EXPENDITURES

Table C shows the categories of government expenditures used in this study. For more simplicity, we have merged some categories of expenditures. The highest sources of overall government expenditures are transfers, health and education.

Table C: Government Expenditures, in million dollars, by Level of Government, Quebec, 2007

	Federal	Provincial
Transfers	15 950	23 426
CPP/QPP	99	7 999
Health	359	22 874
Education	1 207	18 745
Transportation and communications	713	5 896
Housing	820	756
Resource conservation and industrial development	2 296	3 744
Protection of persons and property; national defence; environment; research establishments; other expenditures	7 713	7 640
Regional planning and development; labour, employment and immigration; recreation and culture; foreign affairs and international assistance	3 089	3 652
General purpose transfers to other governments subsectors	2 111	3 440
Debt charges	5 031	7 484
Total	39 288	97 657

Source: FMS, Statistics Canada

Transfers

Federal and provincial personal transfers benefit individuals who receive them. Following Payette and Vaillancourt (1981), we divided the transfers into five federal and three provincial categories.

At the federal level, we examine transfers for the elderly, transfers for the Employment Insurance, the war veterans' allowances, family allowances and social assistance.

The federal government makes most of transfer expenditures to the elderly, such as the Guaranteed Income Supplement, the Allowance for people aged 60-64 and Old Age Security pension. These transfers are allocated directly to the households using the SPSD/M. Moreover, the benefits from Canada Pension Plan (CPP) are added to the benefits from Quebec Pension Plan (QPP).

Eligible individuals can benefit from federal expenditures for Employment Insurance (EI). The received amount of EI is allocated directly based on the SPSD/M.

Expenditures for war veterans' allowances are paid at the federal level to men of 60 years old or more and to women of 55 years old or more who served in the army, and if applicable, to their surviving spouses. We estimated that the war veterans' allowances in Quebec are 12.14 percent of total federal expenditures for this category. To derive this percentage, we first calculated the portion of pensions for the First and Second World War for Quebec and we used the amounts of war veterans' allowances from the CANSIM 384-0009 of Statistics Canada. Since we are unable to determine precisely the amount of allowances received by each household from SPSD/M, we allocated these allowances equally to households in which at least one member is 60 years old or more.

Expenditures for family allowances consist of the federal child tax benefit and the universal child care benefit. The associated amounts are directly allocated to households.

Federal social assistance expenditures include federal sales tax credit and other refundable tax credits. These credits are directly paid to households. Therefore, we distribute them based on the SPSD/M.

Provincial expenditures for personal transfers can be separated into social assistance, workers' compensation benefits and other social services that are included in CANSIM 385-0001.

Provincial social assistance is a transfer to low-income individuals and families in order to increase their welfare and tax credits. To allocate these expenditures among households, we use SPSD/M variables in the following categories: provincial reimbursable tax credits, provincial programs for families and Quebec Parental Insurance Plan (QPIP) benefits.

Expenditures for workers' compensations benefits are carried out by the Commission de la santé et sécurité du travail (CSST), which is a provincial government agency. The corresponding variables in SPSD/M are used to allocate these expenditures.

Other social services category in CANSIM 385-0001 contains expenditures for services to the elderly, to persons who suffer from a physical or mental impairment and to other persons in need. In addition, the expenses of public institutions (hospitals, social service institutions, etc.) and government transfers to private organizations, which provide social services to the population, are included in the other social services category. The recipients of these types of expenditures are usually the persons in need. We allocate other social services proportionally to the provincial social assistance benefits received by households in SPSD/M.

CPP/QPP

The Canada Pension Plan (CPP) and the Quebec Pension Plan (QPP) are retirement plans for individuals of 65 years old or more; individuals less than 65 years of age but more than 60 years old can also receive reduced pensions. We use the corresponding variables in SPSD/M to allocate CPP/QPP total amounts across households in Quebec. Since the SPSD/M does not differentiate between CPP and QPP, we estimated the share of CPP to be 1.23 percent based on the governmental annual reports on CPP and QPP.

Health

Expenditures on health vary with age and sex, as well as the provided type of services, which can be classified into four categories: medical care, hospital care, preventive care and other types of health expenditures (e.g. research, general administration, etc.).

In Canada, provincial governments are mostly in charge of health expenditures. To allocate these expenditures to each income decile, we used the *National Health Expenditure Trends, 1975 to 2013* published by the Canadian Institute for Health Information⁹. We used the expenditures for twenty age groups for both sexes and SPSD/M in order to estimate the amount of health services that each individual received in 2007. We then added up these amounts to obtain health expenditures for each household.

For the distribution of federal health expenditures, we identified the federal direct expenditures and three main categories of health expenditures available in CANSIM 385-0001 of Statistics Canada. These categories are medical care, hospital care and preventive care. Medical care and hospital care benefit individuals in a direct way, therefore we allocate them according to a person's age and sex, as we did at the provincial level.

Expenditures for preventive care can enhance the entire population's health (e.g. by preventing the spread of contagious diseases). Therefore, since the preventive care benefits the entire society, we allocate preventive care expenditures according to the number of persons in each household.

⁹ Available at the following address: https://secure.cihi.ca/free_products/nhex_trends_report_2011_en.pdf

Education

Similar to the expenditures for health, the expenditures for education are in most part realized by the provincial government. The federal government assumes only some expenditures for the postsecondary institutions, in particular in the area of research. The education expenditures are divided into four categories: primary and secondary, postsecondary, retaining of labour and other expenses included in CANSIM 385-0001.

Although the entire society generally profits from the primary and secondary school expenditures, we allocate such benefits to households who have children in primary and/or secondary schools. The expenditures for this category are therefore distributed according to the proportion of children aged 5 to 16 years old in each household.

In the same way, we assume that students in college and universities are solely benefiting from the expenditures in postsecondary education. However, in contrast to primary and secondary students, we need to differentiate between full-time and part-time postsecondary students. We used SPSPD/M to obtain the number of months at school for the distribution of the postsecondary education expenditures. Full-time studies account for 75 percent of such expenditures, whereas part-time studies account for 25 percent.

Since the federal government student loans and grants program does not apply to Quebec, since the Quebec's government administers its own program, federal expenditures at the postsecondary level are mainly focused on research grants. We used data on university and college expenditures from CANSIM 385-0007 to determine the share of federal expenditures that universities in Quebec received. Expenditures in research benefit directly the researchers and indirectly the entire society. Being unable to differentiate between direct beneficiaries of these expenditures, we allocated them based on the number of individuals in each household.

Retaining labour expenditures contribute to re-educate workers and help them to acquire more knowledge in their respective field. Thus, the workers are the direct beneficiaries of these expenditures. In the absence of any data that indicates the households who had benefited from retaining labour expenditures, we distributed these expenditures according to the number of persons in a household between the age of 18 to 65, i.e. the age of entering in a job market and retirement in Canada.

Other expenditures in education include general expenses such as those for Quebec Ministry of Education and the cost of educational related activities. We attribute these expenditures to all the individuals in the society, and therefore according to the number of persons in each household. The allocation of expenditures varies depending on the type of transportation and services. We have separated these expenditures into five categories:

Transportation and communications

The beneficiaries of expenditures in transportation and communication can be classified into three categories: the users, the owners and the consumers. The allocation of expenditures depends on the type of transport or service. We separated transportation and communications expenditures into five categories: The road transit and bridges, the

public transit, the air transport, the rail transport, the water transport, postal services, telecommunication and others. Due to the unavailability of disaggregated data on the federal expenditures for the categories of transportation and communications for each province, we used a combination of data from Transport Canada¹⁰, SPSP/M and the Survey of Household Spending (SHS) for 2007. Those three sources helped us to identify the expenditures that must be directly allocated to the province of Quebec and to exclude the expenditures that should not be accounted for this province.

Given that the transportation and communications category in CANSIM 385-0001 of Statistics Canada includes expenditures for all categories of transport and communication, we estimated the share of communication-related expenditures by subtracting all types of transportation expenditures from the total transportation and communications expenditures.

Due to the lack of more accurate data, we allocate road transit expenditures according to households' gasoline consumption. Since the provincial tax on gas is not uniform across the province of Quebec, for instance there is surtax on gasoline in Montreal and a reduced rate at the proximity of the borders, we used federal taxes on gasoline in order to allocate provincial government expenditures for road transit. At the federal level, we used data from Transport Canada to identify the appropriate share of expenditures for Quebec, such as the expenditures for Jacques Cartier and Champlain bridges, and to exclude the expenditures that must not be attributed to Quebec, such as the road transit expenditures for Northern and Indian affairs. With the exception of the road expenditures for national parks, which were allocated according to the geographic size of parks in Quebec (0.34 percent), and the expenditures for Quebec's capital, 50 percent of which we attributed to Quebec's government, the remaining federal expenditures were allocated based on the proportion of federal taxes on gasoline (21.31 percent) consumed by the households in Quebec. We then distributed the sum of federal expenditures in Quebec according to federal taxes on gasoline for households in each income decile.

Public transit expenditures benefit the users directly by improving the quality of services and/or by subsidizing the cost of public transport, which increases its accessibility for the users. It is reasonable to assume that the public transit services are also beneficial to the non-users, since it reduces the traffic congestion. However, for the purpose of the distribution of public transit expenditures, we suppose that the users assume all the benefits of this service. In addition, we presume that the share of federal expenditures in Quebec for this category, often paid in the form of subsidies, are determined using the share of Quebec's population in the total population of Canada.

For federal and provincial expenditures, we allocate the benefits for each household according to the public transit expenses by households in the Survey of Household Spending (SHS). The share of public transit expenditures for households in an income decile is then used to allocate the aggregate amount of provincial and federal expenditures in public transit.

¹⁰ *Les transports au Canada : un survol, 2009* available at the following address:
http://www.bv.transports.gouv.qc.ca/per/0974402/02_2008/02_Addenda.pdf (site consulté le 12 juillet 2012)

Expenditures for air transport serve to increase the quality of services and reduce the price of tickets for the direct users. They can also benefit the workers in the aeronautic and related industries, in addition to the consumers by reducing the price of transported products, improving the air transport system and decreasing the loss associated with the transportation of food. Due to the lack of disaggregated data, we allocated air transport expenditures according to households' spending on intercity movements (available at the SHS).

To determine the share of federal air transport expenditures for Quebec, we first examined the expenditures by type of transport in Transport Canada database. With the exception of the Airports Capital Assistance Program, for which we found the exact amount of expenditures in Quebec, we used survey data from SHS to attribute the share of air transport expenditures in Quebec from CANSIM 385-0002, according to the share of intercity movement expenditures in Quebec to the total for Canada (12.98 percent).

Similar to the air transport expenditures, rail transport benefits the direct users, the workers in the railroad and related industries and the consumers. For federal expenditures, we use data from CANSIM 385-0002 of Statistics Canada and Transport Canada. Via Rail receives the most important part of these expenditures. Given that more than 94 percent of Via Rail's sales figures depend on its customers, we use the information on the location of train travels in order to attribute the expenditures for each province¹¹. Given that 80 percent of Via Rail customer traffic is taking place between Quebec and Windsor, and since we cannot distinguish the Quebec residents from the non-residents in the pool of the customers, we attributed the share of Quebec in federal expenditures for Via Rail to the half of the customer traffic, that is 40 percent. For other federal expenditures in rail transport, we used the ratio of the population in Quebec to the total population of Canada available at the SPSD/M. We then redistribute the total of all federal (for Quebec) and provincial expenditures according to each household's spending in intercity transportation.

For water transport, postal services, telecommunications and other expenditures, we used the same sources of data mentioned above. For federal expenditures, we relied on Transport Canada data for the calculation of non-applicable expenditures to Quebec, such as the payments for services of Marine Atlantic and ferries in British-Columbia. Once again, due to the lack of disaggregated federal data for each province, we used the share of Quebec in the total population (23.42 percent) as an allocation rule. The benefits are then distributed according to the number of persons in each household.

Housing

Federal and provincial expenditures in housing are carried out for the construction and maintenance of public housing. Therefore, the low-income families are the main beneficiaries of this category of expenditures. Assuming that the higher the number of people is in a household, the larger would be the residence (although we admit that this relation is not one to one), we distributed the benefits from housing proportionally to the

¹¹ Via Rail Annual Report available at the following address:
http://publications.gc.ca/collections/collection_2011/viarail/TN1-1-2007-fra.pdf

number of individuals who are renting a dwelling in the bottom five deciles. Therefore, we suppose that the housing benefits are related to the size of the household, size of the dwelling and the government subsidies.

Resource conservation and industrial development

This category includes the services related to the conservation and exploitation of natural resources, such as agriculture, fish and game, oil and gas, forestry, mining, water power, tourist promotion, commerce and industry, and other associated services.

Since the data on federal expenditures is not disaggregated for each province, we use different types of allocators to distribute those expenditures in Quebec.

Expenditures on agriculture consist of either the general expenditures in administration and research, or the direct subsidies and other expenses for the maintenance of prices in the market. Although one might argue that such expenditures can benefit the entire society, for example by lowering the prices of agricultural products for consumers. However, following Payette and Vaillancourt (1986), we assume that the households with revenues from agriculture are the sole beneficiaries of expenditures in agriculture and allocate them according to the number of persons in a household who earn an income from agriculture.

For the expenditures on fish and game, oil and gas, forestry, mining, waterpower, tourist promotion, commerce and industry, and other related services to resource conservation and industrial development, we either used the number of individuals in a household or the household broad income to distribute the expenditures. The former has a positive impact on the progressivity of expenditures, while the latter does not have any distributional effect.

Protection of persons and property; national defence; environment; research establishments; other expenditures

It is difficult to assess the beneficiaries of the expenditures for this category. For instance, the fire fighting services benefit the owners of dwellings directly, as well as their tenants. Moreover, the national defence benefits the entire population. The question is then whether the high-income families who have more possessions benefit more than the rest of the population? In the same vein, it is difficult to identify who benefits the most from the environment protection. In the light of these difficulties, we chose to allocate the expenditures in this category either by the number of people in a household or by the household broad income.

Regional planning and development; labour, employment and immigration; recreation and culture; foreign affairs and international assistance

These expenditures benefit individuals who live in rural areas, participate in labour, employment and immigration programs, or use the recreation and culture centers or programs.

The expenditures in foreign affairs and international assistance have the objective of promoting the interests of Quebec and Canada in the world. We either use the number of people in a household or household broad income to allocate these expenditures.

General purpose transfers to other governments subsectors

The expenditures of this category correspond to the executive and legislative services of federal and provincial public administrations. They promote the proper functioning of the government and therefore can be allocated either by the number of people in a household or the household global income.

Debt charges

The deficit and the public debt that results from it is the consequence of higher government expenditures than revenues. Debt charges do not necessarily benefit the individuals who have to reimburse them. We can treat the debt charges in two different ways: Either we exclude them from the government expenditures (and adjust them on the revenue side), or include them in the expenditures of the studied year. We used the second method and allocated the debt charges either by the number of people in a household or household global income. The rationale behind this choice is that the current deficit provides the necessary financing for some services that are not captured by the current expenditures. For the federal debt charges, we first estimated the share of Quebec based on the ratio of the population and then allocated them in a similar fashion to the provincial debt charges.