

Does Health-Care Spending Crowd Out Other Provincial Government Expenditures?

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Les dépenses de santé, qui constituent la plus grande partie des dépenses des gouvernements provinciaux, se sont accrues considérablement au cours de la dernière décennie. L'on a soutenu que l'augmentation des dépenses de santé a conduit les gouvernements à réduire les dépenses destinées à d'autres types de services gouvernementaux. En utilisant une série de données, au niveau provincial, pour la période allant de 1998/89 à 2003/04, notre étude a pu tester l'hypothèse que les dépenses de santé ont fait obstacle à d'autres types de dépenses. Les résultats indiquent que, pour la période étudiée, il n'y a aucune preuve que l'accroissement des dépenses de santé des gouvernements provinciaux ait fait baisser le niveau des dépenses destinées à d'autres catégories de produits et services fournis par les gouvernements.

Health spending, the largest component of provincial government spending, has risen significantly over the past decade. It has been asserted that larger health expenditures have caused provincial governments to spend less on other types of government services. Using a panel of province-level data for the period 1988/89 to 2003/04, this study provides a test of the hypothesis that health spending has crowded out other types of spending. The results indicate that, for the period studied, there is no evidence that increased provincial government health expenditures resulted in lower levels of spending on other categories of government provided goods and services.

“Health care spending continues to be the pacman eating up the rest of provincial budgets.”

Don Drummond, *Financial Post*, 25 April 2003

“In the late 1990s, the spiraling costs of health care sapped provinces of their capacity to innovate or fund adequately other key responsibilities, such as post-secondary education and infrastructure....”

Janice Mackinnon, *Minding the Public Purse*, p. 229

“According to Hugh Segal of Montreal’s Institute for Research on Public Policy ... health costs ... are ‘crowding out’ other spending needs.”

The Economist, 27 September 2003, p. 36

“Health care has grabbed so many marginal dollars that your governments have been unable to fund other vital obligations....”

Paul Martin quoted by Jeffrey Simpson in *The Globe and Mail*, September 11, 2004

INTRODUCTION

The view that the growth in provincial government health-care spending has crowded out government expenditures on other types of goods and services is widespread. In addition to the statements quoted above, the issue of crowding out is noted explicitly in several analyses of the health-care system,¹ while concern about the potential for crowding out is raised in the reports of both the Kirby Commission (Canada 2002a) and the Romanow Commission (Canada 2002b). For example, the Romanow Commission report states: “In addressing the apparent deficit in health funding, that deficit should not be passed on to post-secondary education and social assistance” (Canada 2002b, 69). The potential for crowding out underlies the discussions

of the sustainability of public health-care spending that are found in the studies cited above as well as in many other studies (such as Brimacombe, Antunes and McIntyre 2001, Frank 2003, Ruggeri and Yu 2003, Lazar and St-Hilaire 2004, and Jackson and McDermott 2004). While the existence or potential for crowding out appears to be widely accepted, so that increases in health spending are perceived to be a threat to other types of program spending, the hypothesis that health-care expenditures have crowded out other forms of provincial government spending has not been tested.² The purpose of this study is to examine the crowding-out hypothesis empirically. The analysis addresses the impact of health spending on total non-health provincial government program spending as well as on specific categories of provincial spending — education, social services, and other program spending.³

Several factors appear to have generated the concern over crowding out. For one, health spending by the provincial governments has grown substantially. Between 1975 and 2003, provincial government health spending rose from 5.0 to 6.5 percent of gross domestic product (GDP), while real per capita provincial health spending increased from \$1,102 to \$2,329, a 111 percent increase (2.7 percent per annum).⁴ Health spending has also grown in importance in provincial budgets. From 1974/75 to 2003/04, health expenditures grew from just under 29 percent to almost 37 percent of provincial government program spending.⁵

The upward trend in health expenditures abated during the period of fiscal restraint in the early and mid-1990s, but has picked up sharply since then. From 1997/98 to 2003/04, the annual growth in provincial health expenditures was 7.6 percent, while total provincial expenditures grew by 4.9 percent per annum and total revenues grew by 4.5 percent. Health is the largest single item in the budgets of all provinces and, as of 1997/98, health spending surpassed education spending as the largest expenditure category for all levels of government in

aggregate.⁶ The rate of increase in provincial health spending, especially the recent resurgence, has attracted considerable attention and has prompted speculation and concern about future rates of growth in health expenditures relative to both other types of government expenditures and government revenue.⁷

That health expenditure has grown rapidly and is taking a larger share of provincial program spending does not necessarily mean that health spending is crowding out other provincial expenditures. In determining the quantity of different goods and services to provide, it is assumed that provincial governments weigh the benefits and costs of each type of good and service to voter-taxpayers. These benefits and costs are likely to depend on many factors and, thus, numerous, and potentially different, factors are expected to influence the level of expenditures on different categories of goods and services. For example, declining birth rates may contribute to a relative decline in education outlays, while a growing demand for postsecondary education may help to sustain these expenditures. As a result, spending readjustments may simply reflect changes in the factors that determine the costs and benefits of different types of expenditures and, thus, may not be due to one type of expenditure “crowding out” other expenditures. The core of the crowding-out hypothesis must be, therefore, not just that health spending has grown, or grown relative to other types of expenditures, but that the growth in health spending has had a negative impact on non-health expenditures that is over and above the impact of other factors that determine non-health spending. Crowding out is not simply that budget shares have changed or, especially, that more has been spent on one good and less on another since such changes could be optimal responses to exogenous factors and, thus, would be of little concern. Rather, to be an issue of importance, crowding out must entail a movement in the distribution of expenditures such that expenditures on one category of good adversely impact those of another category and shift them away from the optimal level.

While the empirical literature on crowding out is surprisingly small, and formal tests of crowding out have not been undertaken with Canadian data, evidence from studies that use data for the United States suggests that crowding out of other types of government expenditures by health spending may not be significant. Fosset and Wyckoff (1996) examine whether the rapid growth in state Medicaid expenditures depressed state spending on schooling. From their analysis of expenditures in 47 US states for the 1980 to 1990 period, they conclude that Medicaid expenditures did not have a significant effect on state spending in support of schooling. Motivated by rapid growth in Medicaid and corrections expenditures, McCarty and Schmidt (1997) examine the effect of increases in these two types of expenditures on six categories of state government spending (schooling, higher education, welfare [which includes Medicaid], health and hospitals, corrections and miscellaneous) using data for 48 states from 1984 to 1994. McCarty and Schmidt find no evidence that any type of expenditure crowds out other types of expenditures and conclude that increases in spending above trend in one category were paid for by additional tax revenues, rather than by reductions in other expenditures.

Two other studies consider the issue of crowding out, but do not consider crowding out by health expenditures. Marlow and Shiers (1999) examine the effect of state law enforcement spending on education spending and do not find a negative relationship between the two. Brazer and McCarty (1987) examine whether, when municipalities and school districts share the same property tax base, municipal spending crowds out school spending (“municipal overburden”). They find no evidence of this type of crowding out.

Following Fosset and Wyckoff (1996) and McCarty and Schmidt (1997), the present study takes an empirical approach in order to determine whether growing provincial health-care expenditures have crowded out other provincial expenditures. The

plan of the paper is as follows. In the following section, provincial health and other spending data for the study period are discussed and patterns in the data are examined. This section is followed by a description of the expenditure model to be estimated. The empirical results are then presented and interpreted. The paper ends with a brief conclusion. The results described below indicate that there is no evidence that health-care spending crowded out other provincial expenditures during the sample period.

EMPIRICAL ANALYSIS

Provincial Government Expenditure Data and Trends

The analysis employs a panel of province-level data for the period 1988/89 through 2003/04.⁸ Non-health program expenditures are considered both as an aggregate (*All Other Expenditures*) and disaggregated into three categories — *Education Expenditure*, *Social Service Expenditure* and a residual category (*Residual Expenditures*). While the time span of the sample period is somewhat short, 1988/89 is the earliest year for which Statistics Canada currently provides consistent disaggregated government expenditure data by province.⁹

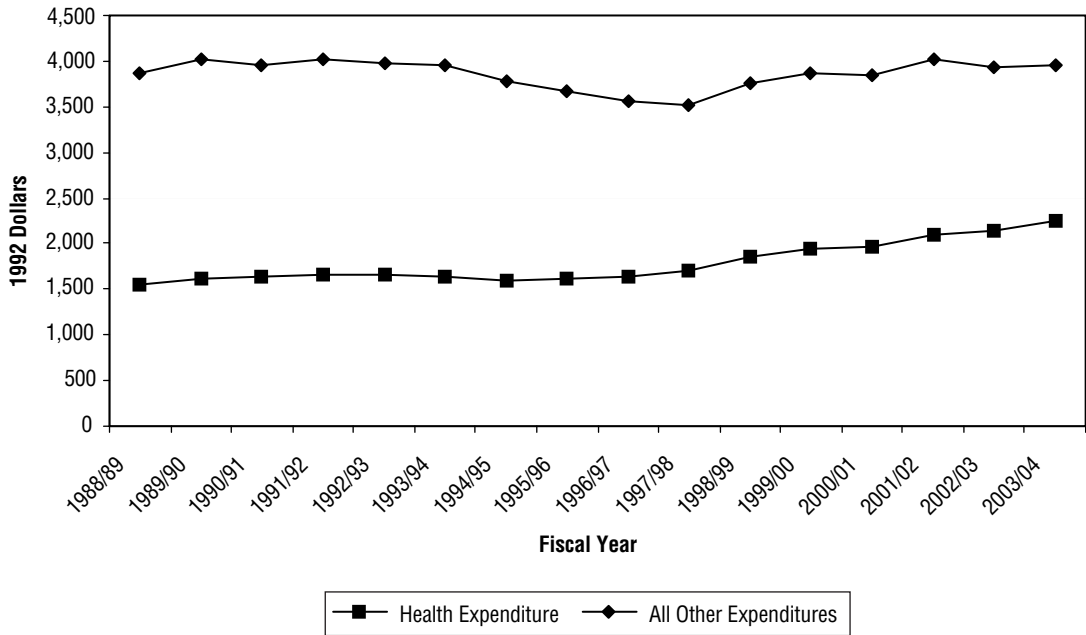
The limitation on the length of the study period is not likely to be critical to the present analysis. Although the sample period (1988/89–2003/04) is often considered to be a period of expenditure contraction only, this view is not consistent with the data. Aggregate real per capita provincial expenditures (both total and program spending) generally expanded from 1988/89 through 1992/93, then contracted until 1997/98, and finally expanded through 2003/04. Thus, the sample spans periods of both expenditure expansion and contraction. Further, provincial health expenditures have risen significantly, both in real terms and relative to other provincial expenditures, over the period analyzed. Thus, the principal condition for crowding out, a relative increase in health expenditures, is evident in the data.

Indeed, the issue of crowding out is recent and seems to be the product of the post-mid-1990s surge in health spending. Due to the fact that health spending grew considerably in relative importance during the sample period, if anything, the data create a superior opportunity to reveal evidence of crowding out and afford a relatively rigorous case for rejection of crowding out when contrary evidence is found. Given that the shorter sample weights the period of rapid health expenditure expansion more heavily than would a longer sample, the results may be biased in the direction of finding evidence of crowding out.¹⁰

Figure 1 illustrates the trends over the study period in the ten-province average of real per capita provincial government health expenditures and all other (non-health) program expenditures. While health spending was relatively constant for the first half of the sample period, it rose considerably over the latter half of the period. Average health spending was \$1,553 per capita in 1988/89 and only \$1,607 in 1995/96, but then increased by almost 40 percent to \$2,248 in 2003/04.¹¹ On the other hand, the average across provinces of all other expenditures per capita fell during the mid-1990s before recovering to its original level by the end of the period. The data in Figure 1 do not suggest an obvious negative relationship between health expenditures and all other expenditures (as would be implied by the crowding-out hypothesis). The decline in all other expenditures from 1994/95 through 1997/98 was not accompanied by an increase in health expenditures. Similarly, the increase in health expenditure that began in the mid-1990s was accompanied, for at least part of the period, by a recovery in spending on all other goods.

It is possible that the aggregation of expenditure categories might mask the impact of provincial health spending on important subcategories of other expenditures. Hence, the data for spending on all other goods and services are disaggregated into three types of spending: social service expenditures,

FIGURE 1
Real Per Capita Provincial Government Expenditures: Health and All Other Expenditures (average of provincial data)



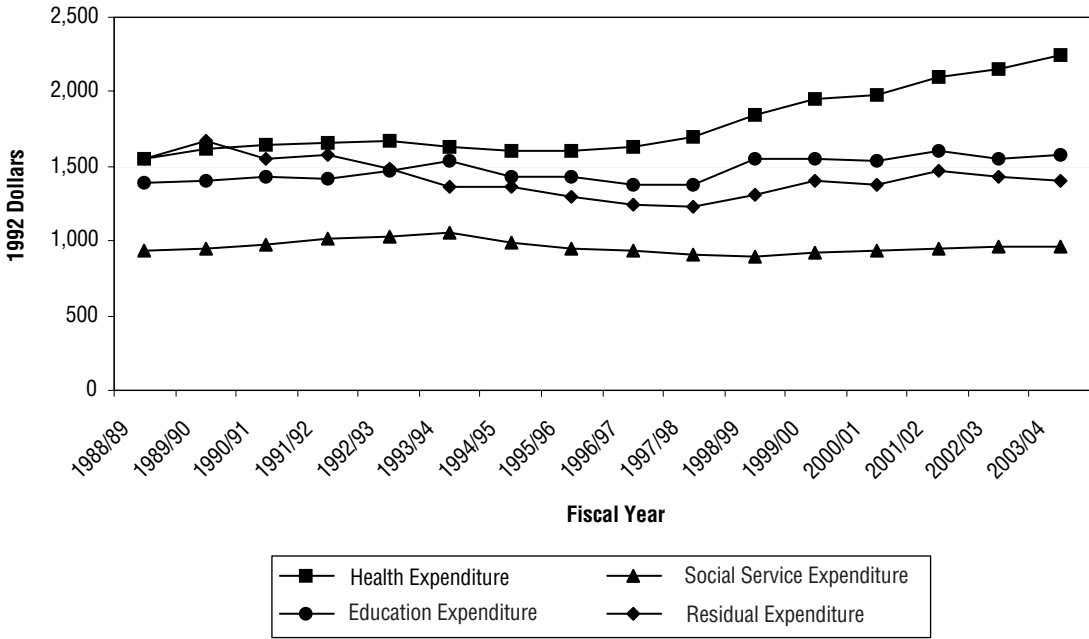
education expenditures, and residual expenditures. The average real per capita values of these expenditures are plotted with those for health in Figure 2. Once again, the recent rise in health spending does not appear to be associated with systematic changes in the other types of spending.¹²

The correlation coefficients between provincial government health expenditures and other types of provincial expenditures tend to confirm the general patterns observed in Figures 1 and 2.¹³ The correlation between real per capita health expenditures and all other expenditures is only 0.023, while the correlation coefficients between health spending and spending on social services, education, and residual spending are, respectively, 0.015, 0.277 and -0.144.

These correlation coefficients suggest, at most, only a weak relationship between health spending and other types of spending. Further, the positive correlations between health spending and aggregate non-health expenditures, education expenditures and social service expenditures would appear to contradict the crowding-out hypothesis.

The data show substantial growth in provincial government health expenditures during the second half of the study period. Has that growth crowded out other expenditures? In general, the evidence of the simple correlation coefficients and Figures 1 and 2 suggests that none of the non-health expenditure categories was adversely affected (except, perhaps, residual expenditures). On the other hand, the

FIGURE 2
Real Per Capita Provincial Government Expenditures by Type (average of provincial data)



observed movements in different types of government expenditures are likely to be the result of changes in many factors, and these changes could obscure the existence of a negative relationship between health spending and other forms of government spending. In order to investigate this possibility, it is necessary to specify and estimate a model of government non-health expenditures that controls for the key determinants of these outlays, while also allowing for the possibility of crowding out.

Modelling Provincial Government Expenditures

In a standard model of government-expenditure determination, a government chooses its spending on

each type of good by maximizing an objective function (such as the probability of re-election or the utility of a representative or median voter) subject to the government’s budget constraint (Hettich and Winer 1999). The optimal levels of expenditure that result depend typically on exogenous demand and supply factors. Following this approach, let provincial government real per capita non-health expenditures in period t (S_t) be given by the function:

$$S_t = \beta_0 + \beta_1 S_{t-1} + \beta_H H_t + \beta_2 X_{St} + u_{St}, \quad (1)$$

where X_{St} is a vector of exogenous factors, the lagged dependent variable term ($\beta_1 S_{t-1}$) allows for the persistence of spending through time, and u_{St} represents the random component of spending.¹⁴

The only difference between equation (1) and a standard government expenditure equation is that equation (1) includes H_t , the level of real per capita health expenditures, as an additional explanatory variable. The inclusion of H_t in equation (1) allows health spending to have a direct impact on other spending, holding the other factors that determine S_t constant, as would be suggested by the crowding-out hypothesis. If an increase in health expenditures causes provincial governments to systematically reduce spending on other goods from the level they would otherwise choose, the parameter β_H should be significant and negative. If the parameter β_H is insignificantly different from zero, this would indicate that movements in S_t are determined by movements in exogenous demand and supply factors only, that the level of health expenditures does not directly affect the choice of S_t and, thus, that there is no evidence of crowding out. This methodology gives crowding out a specific welfare interpretation — crowding out exists if spending on health causes spending on other goods to fall below the level that would normally have been chosen given the exogenous determinants of spending. It is this potential welfare implication of crowding out that makes it important from a policy perspective.¹⁵

As government spending of all types is linked by the government budget constraint and, potentially, through the government's objective function, health spending is likely to be correlated with the error in the non-health expenditures equation. As this linkage would make health spending endogenous in equation (1), the estimation of this equation should take this potential endogeneity into account. This is done by, first, specifying real per capita provincial government health spending (H_t) to be a function of a lagged dependent variable and a vector of exogenous factors (X_{Ht}):¹⁶

$$H_t = \alpha_0 + \alpha_1 H_{t-1} + \alpha_2 X_{Ht} + u_{Ht}, \quad (2)$$

and, second, estimating the two spending equations jointly, with equation (2) used to substitute out for

the variable H_t in equation (1), so that the model becomes a two-equation non-linear system.¹⁷

In order to estimate equations (1) and (2), it is first necessary to specify the components of the vectors X_H and X_S . Underlying equations (1) and (2) is the assumption that governments, acting on behalf of their constituents, choose S_t and H_t to maximize an objective function subject to a budget constraint. The elements of the vectors X_H and X_S are factors, exogenous to the government's current choices, which enter the objective function or the budget constraint.¹⁸ To undertake the empirical analysis, while maintaining the relative parsimony of the empirical specification, the arguments of the vectors X_H and X_S were chosen to represent the most important determinants of government expenditures. *As a priori* restrictions are difficult to justify, the same factors were chosen for both vectors.¹⁹ To check the robustness of the chosen specification, a large number of alternative specifications were employed. The major alternative specifications and their effects on the results (which are minimal) are described briefly at the end of the next sub-section.

One of the principal determinants of government expenditures is likely to be real per capita personal income (*personal income*). This variable reflects the magnitude of a province's tax base and, in addition, is widely recognized to be an important determinant of voter demand for government services.²⁰ The revenues available to provincial governments will also depend on the size of transfers from other levels of government. Real per capita transfer payments (*transfers*) are introduced as a separate variable because of the overwhelming evidence that transfers affect government spending differently than *personal income*.²¹ All federal cash transfers are included in the *transfers* variable because only a small portion of transfers are effectively conditional.²² The exogenous spending commitment implied by each provincial government's outstanding debt may also affect current spending. The magnitude of this commitment is represented by real

per capita expenditures on debt-servicing (*debt charges*).

The level and distribution of provincial spending across different types of expenditures is also likely to depend on factors that affect the demand for government services, such as demographic factors and factors that reflect the taste of residents for government services. Demographic factors are represented by the proportion of the population that is aged 65 or older (*old*) and the proportion that is younger than five (*child*).²³ The aged, in particular, but also young children, are often associated with greater health needs. Further, different age groups may have different degrees of resistance to tax/expenditure increases. Demographic and taste factors that are constant across time, but that differ across provinces, are represented by provincial dummy variables,²⁴ while dummy variables for the political party in power are used to represent differences in voter preferences for government spending across time.²⁵

The empirical specification employed here parallels the specifications used in related models. Equation (2), the health equation is similar to other empirical specifications of provincial health expenditures — for example, Di Matteo and Di Matteo (1998) and Ariste and Carr (2003) — in that it includes an income variable, intergovernmental transfers, age variables, debt charges, and is estimated using panel data. The model used here is also similar to the models used to study the impact of health spending on other spending by US states. McCarty and Schmidt (1997) employ only income and transfers as explanatory variables, while Fossett and Wyckoff (1996) include income, transfers, and the percentage of the population over age 65, along with a variety of variables specific to health and schooling as well as state and time dummy variables.

Estimation and Results

Taking the natural logarithm of all variables,²⁶ and defining S_t as *all other expenditures* — real per capita provincial government spending other than

spending on health and debt charges, equations (1) and (2) are estimated jointly using a panel of provincial-level data for the period 1989/90 through 2003/04. Parameter estimates are reported in Table 1.²⁷ These estimates explain a large proportion of the variation in the dependent variables, there is no evidence of serial correlation, the marginal effects appear reasonable, and the signs of the coefficient estimates associated with the control variables are generally as expected. There is significant persistence in both types of spending, with *health expenditure* tending to be more persistent, but the estimated speeds of adjustment do not appear to be unreasonable. While both *personal income* and *transfers* have positive coefficients, *personal income* has a significant coefficient only in the *all other expenditures* equation. The impact of the *debt charges* variable on spending is negative, with a significant coefficient only in the *health expenditure* equation. The proportion of old in the population does not have a significant coefficient in either equation, while the percentage of young children is found to have a significant negative effect on health spending (perhaps reflecting the impact of a generally younger population overall), but a positive effect on all other spending.²⁸

In order to determine whether the results reported in Table 1 depend on the aggregation of expenditures, Table 2 presents coefficient estimates for the case in which the *all other expenditures* variable is disaggregated into three types of spending, *social service expenditure*, *education expenditure* and *residual expenditures*, and expenditure equations for these three types of spending are estimated jointly with the health equation.²⁹

Once again, the parameter estimates explain a large proportion of the variation in the dependent variables, there is no evidence of serial correlation, the signs of the estimated coefficients associated with the control variables are generally as expected, and the estimated parameters are generally consistent with the results of Table 1, although there are several interesting differences across the

TABLE 1
Health and All Other Expenditure Coefficient Estimates

Explanatory Variables	Dependent Variables		Dollars per Capita Marginal Effects for All Other Expenditures ^{‡‡}	
	Health Expenditure	All Other Expenditures	Short Run	Long Run
Health expenditure [‡]		0.2143** (2.27)	0.4585	.6825
Lagged dependent variable	0.6214** (7.37)	0.3282** (3.95)		
Personal income	0.2805 (1.52)	0.5541** (2.48)	0.1033	0.1538
Transfers	0.0688** (2.26)	0.1248** (3.24)	0.3052	0.4543
Debt charges	-0.0645** (2.16)	-0.0212 (0.55)	-0.0932	-0.1387
Old	-0.1629 (1.15)	-0.0856 (0.68)	-129.99	-193.50
Child	-0.3997** (4.25)	0.4186** (3.35)	251.94	375.02
R ²	0.890	0.868		
AR1 Test	0.99 [†]	0.50 [†]		

Notes: – Expenditure data are in log real per capita terms for each province.

– Number of observations = 150 (10 provinces over 15 years).

– Sample period: 1989/90–2003/04.

– The estimating equations also included a constant, provincial dummy variables, and political party dummy variables (these have not been reported to conserve space).

– All variables, except the dummy variables, are in natural logarithms.

– The number below each coefficient estimate is the absolute value of the heteroscedasticity consistent t-statistic.

– *All other expenditures* = total expenditures – *health expenditure* – *debt charges*

** significant at 95 percent * significant at 90 percent

‡ – As *health expenditure* is endogenous, the *health expenditure* and *all other expenditures* equations are estimated jointly with the *health expenditure* variable in the *all other expenditure* equation replaced by the *health expenditure* equation.

‡‡ – The impact on *all other expenditures*, in dollars per capita, of a one-dollar per capita increase in each explanatory variable holding all other explanatory variables constant except for *old* and *child* for which it is the impact of a one percentage point increase.

† – A test for serial correlation cannot reject the hypothesis of no serial correlation. The test statistic is the t-statistic associated with the coefficient on the lagged residual in a regression of the residuals on the lagged residuals and the explanatory variables that appear in the original regression equation (see Davidson and MacKinnon 1993, 357-59). The test conclusion is unchanged if only the lagged residuals are included in the test regression or if the standard errors from the test regression are corrected for heteroscedasticity.

TABLE 2
Health, Social Service, Education and Residual Expenditure Coefficient Estimates

<i>Explanatory Variables</i>	<i>Dependent Variables</i>			
	<i>Health Expenditure</i>	<i>Social Service Expenditure</i>	<i>Education Expenditure</i>	<i>Residual Expenditures</i>
Health expenditure		0.1609 (0.80)	-0.0203 (0.19)	0.3656** (2.09)
Lagged dependent variable	0.6214** (7.37)	0.6299** (5.26)	0.1294 (1.13)	0.3671** (4.49)
Personal income	0.2805 (1.52)	0.7113** (2.44)	0.9672** (3.68)	0.2516 (0.65)
Transfers	0.0688** (2.26)	0.0482 (0.74)	-0.0447 (0.95)	0.2703** (4.11)
Debt charges	-0.0645** (2.16)	-0.0271 (0.37)	-0.0029 (0.09)	-0.0853 (1.13)
Old	-0.1629 (1.15)	0.1652 (0.69)	0.1519 (0.91)	-0.5370** (2.14)
Child	-0.3997** (4.25)	0.5968** (3.06)	0.1520 (1.06)	0.4488** (2.34)
R ²	0.890	0.925	0.805	0.885
AR1 Test (t-statistic)	0.99†	0.37†	0.24†	0.08†

See the notes to Table 1.

Residual expenditures = total expenditures – health expenditure – debt charges – social service expenditure – education expenditure.

expenditure categories. The coefficients on the lagged dependent variables are significant in all cases except for *education expenditure*. *personal income* is a significant determinant of *education expenditure* and *social service expenditure*, while *transfers* are not. In contrast, *transfers* have a significant impact on *health expenditure* and *residual expenditures*, but *personal income* does not. *Debt charges* have a negative impact on all four types of

spending, but have a significant coefficient in the health outlays equation only.³⁰ Finally, the proportion of young children has a positive effect on *social service expenditure*, *education expenditure* and *residual expenditures*, but does not have a significant impact on *education expenditure*. In summary, while there are some differences across expenditure categories, the results in Table 2 generally parallel the results for *all other expenditures* in Table 1.

Turning to the variable of prime interest, the first rows of Table 1 and Table 2 present estimates of the coefficient (β_H) that represents the impact of *health expenditure* on non-health spending. These estimates provide no support for the hypothesis that health spending has crowded out other types of expenditure. In Table 1, the coefficient on the *health expenditure* variable in the *all other expenditures* equation is positive and significant. This result implies that provincial governments tend to move both types of expenditures in the same direction. The disaggregated results reported in Table 2 also do not support the crowding-out hypothesis. Increases in *health expenditure* do not have a significant positive or negative effect on either *social service expenditure* or *education expenditure*, but have a positive and significant effect on *residual expenditures*.³¹ The implication of these results is that there is either no relationship between health spending and other expenditures (as in the case of social services and education) or a positive relationship (as in the all other or residual expenditures categories) in which case health and other expenditures move in the same direction.³² Hence, the statistical evidence reported in Tables 1 and 2 provides no support for the hypothesis that, during the sample period, health expenditures crowded out either non-health provincial program spending in aggregate or any major category of provincial government spending. Indeed, the results imply the opposite — that health and non-health expenditures tend to move in tandem.

To demonstrate that the results are robust to alternative specifications, the two estimating equations were extended and varied in several ways. Estimates of the coefficient (β_H) associated with the *health expenditure* variable in the non-health expenditure equations corresponding to these different specifications are presented in Table 3. The first column in Table 3 reports the estimated *health expenditure* coefficient in the *all other expenditures* equation, while the last three columns in Table 3 report the estimated *health expenditure* coefficient in the *social service expenditure*, *education expendi-*

ture and *residual expenditures* equations, respectively. The addition of numerous explanatory variables (including the addition of a dummy variable for each year), the deletion of most of the explanatory variables, and the estimation of the model in levels rather than logs has little effect on the essential conclusions of the empirical results.³³ The impact of *health expenditure* on *all other expenditures* and *residual expenditures* remains positive and significant in almost every case, while the impact of the *health expenditure* variable on *social service expenditure* and *education expenditure* is generally insignificantly different from zero.³⁴ Furthermore, the coefficients are relatively uniform. Indeed, the magnitude and significance of the coefficients are quite consistent, particularly for those cases that could be considered to be the most reasonable specifications. Not a single alternative specification yields estimates that support the hypothesis that an increase in health spending leads to a statistically significant decline in other types of provincial government expenditures.

CONCLUSION

Although it has often been stated that an increase in provincial government spending on health services causes a reduction in provincial government spending on other types of goods and services, this assertion has not been tested empirically. This study uses statistical methods to examine the hypothesis that increased health spending has crowded out other types of provincial government expenditures and finds no evidence to support this hypothesis for the 1988/89 through 2003/04 period.³⁵

The evidence presented here against the crowding-out hypothesis is found despite the fact that average provincial real per capita health spending grew by approximately 50 percent over the final half of the 16-year period studied and, also, that health-care expenditures increased from 30 to 36 percent of provincial budgets over the whole period.

TABLE 3
Estimates of Health Spending Coefficients under Different Model Specifications

	<i>Dependent Variable</i>			
	<i>All Other Expenditures</i>	<i>Social Service Expenditure</i>	<i>Education Expenditure</i>	<i>Residual Expenditures</i>
Estimates Reported in Tables 1 and 2	0.2143**	0.1609	-0.0203	0.3656**
<i>Changes to the Specification in Tables 1 and 2</i>				
1. Replace <i>personal income</i> with per capita GDP	0.2404** (2.26)	0.2462 (1.15)	-0.0144 (0.11)	0.4190** (2.17)
2. Split <i>transfers</i> between general and specific transfers	0.2659** (3.20)	0.1775 (1.10)	-0.0935 (0.94)	0.4736** (3.03)
3. Add individual year dummy variables	0.1784** (1.96)	0.0088 (0.05)	-0.1065 (0.92)	0.4277** (2.61)
4. Add a school-age population (ages 5–24) variable	0.2233** (2.34)	0.1708 (0.77)	0.0056 (0.05)	0.3840** (2.23)
5. Add the unemployment rate	0.2138** (2.31)	0.1289 (0.65)	-0.0283 (0.24)	0.4109** (2.48)
6. Add the relative prices of government services	0.2031** (2.11)	0.1692 (0.88)	-0.0627 (0.57)	0.3454* (1.92)
7. Add the variables in 3, 4, 5, and 6 jointly	0.1324 (1.29)	-0.0719 (0.34)	-0.1834 (1.30)	0.3852** (2.22)
8. Add trend variable	0.2228** (2.36)	0.1697 (0.83)	-0.0285 (0.26)	0.3991** (2.31)
9. Add population ages 5 to 17	0.2049** (2.19)	0.1512 (0.70)	0.0080 (0.07)	0.3447** (2.02)
10. Delete the political party dummy variables	0.1898** (2.27)	0.1815 (1.05)	0.0464 (0.40)	0.2873* (1.95)
11. Delete the <i>old</i> and <i>child</i> variables	0.0353 (0.42)	-0.0195 (0.12)	-0.0491 (0.53)	0.1142 (0.76)
12. Delete all variables except the <i>lagged dependent variable</i> , the constant and the provincial dummy variables	0.0818** (2.30)	0.0482 (0.92)	0.1763** (3.17)	0.0779 (1.24)
13. Estimate in levels rather than natural logarithms	0.5738** (2.41)	0.1278 (1.45)	0.0011 (0.01)	0.4414** (2.61)

See the notes to Table 1.

Although budget shares have changed, the levels of spending on health and non-health services appear to follow a relatively standard model of government expenditure determination. That is, they generally depend, although to different degrees, on provincial income, transfers, debt-payment commitments, demographics and tastes.

Since real health spending per capita has increased since the mid-1990s — although this has not led to a decrease in other program spending — how has the increase in health spending been financed? In aggregate, provincial governments increased real per capita program spending by 16 percent from 1996/97 to 2003/04. Almost 75 percent of this increase was financed through increased revenues, with almost a third of this increase in real per capita revenues due to increased transfers from other levels of government.³⁶ The balance of the increase in program spending was primarily facilitated by the decline in debt charges caused by a fall in interest rates. The empirical results presented in Tables 1 and 2 indicate that, while debt charges may have had an adverse effect on all types of program spending, debt charges had a significant negative effect on health spending only. This suggests that the fiscal dividend that accrued to the Canadian provinces as a result of lower interest rates in the 1990s, although small relative to the change in total program spending, went primarily into health-care expenditures.

As there is no evidence that increased health spending has crowded out other types of provincial expenditures during the sample period, while the bulk of increased health spending has been financed by increased revenues, it seems likely that the increase in health spending has crowded out private spending. Formally testing this hypothesis, although beyond the scope of the current analysis, is an important and interesting avenue for future research.

It is important to interpret the results presented above with due caution. While there is no evidence

that health expenditures have crowded out other government expenditures during the period studied, this does not, of course, imply that there is no risk of crowding out in the future. One reason why there may be no evidence of crowding out in the sample considered here is that, in the latter half of the study period (that is, at least since the late-1990s), it was easier for governments to finance increased health expenditures. Falling interest rates during this period contributed to relatively lower debt-service payments,³⁷ while rising incomes and increases in intergovernmental transfers led to improved fiscal capacity.³⁸ Higher interest rates or a slowing of the growth rate would make financing increases in health spending more difficult. Further, the aging of the population, improved and expanding health technologies, and increases in the cost of health services suggest that health costs may continue rising. Thus, in the future, governments may face the choice of raising taxes, controlling the growth of health expenditures, or cutting other types of program spending. As a result, although we have not observed crowding out over the recent past, this does not imply that the continued growth of health expenditures will not threaten other types of program spending in the future. Whether or not crowding out occurs in the future will only be revealed by future research. Nevertheless, for the 1988/89 to 2003/04 period, we find no evidence that health-care expenditures have crowded out other provincial government expenditures.

NOTES

The authors are thankful for the valuable comments of the editor, an associate editor and the referees, but remain responsible for all errors. The views expressed in this study are those of the authors and do not reflect in any way those of Finance Canada.

¹The Fyke Commission report (Saskatchewan 2001, 103), the Mazankowski Commission report (Alberta 2001, 4), Boothe and Carson (2003, 2), Mackinnon (2004), and Scott (2004).

²Scott (2004) presents data on the growth rates of different types of health expenditures and discusses the issues of crowding out and sustainability. Although, unlike other commentators, he questions the existence of crowding out, he does not formally test the crowding-out hypothesis.

³Program spending is public spending exclusive of spending on debt-servicing.

⁴Canadian Institute for Health Information (2004). In addition, private spending rose from 23.8 to 30.1 percent of total spending on health care, so the increase in provincial government spending was not due to the substitution of public spending for private spending.

⁵The observation for 1974/75 is from the Mazankowski Commission report (Alberta 2001, 40), while the latter observation is calculated using data from Statistics Canada, Cansim II database, Table 3850001.

⁶The values in this paragraph are calculated using data from Statistics Canada, Cansim II, Table 3850001.

⁷Forecasts of future spending patterns project that health expenditures will continue to comprise a larger share of GDP and provincial budgets (see, e.g., Brimcombe, Antunes and McIntyre 2001, Jackson and McDermott 2004, The Conference Board 2004). One projection estimates that health expenditures will account for 40 percent of program spending by 2010 (Frank 2003).

⁸See the Appendix for specific variable definitions and data sources.

⁹Statistics Canada recommends that these data not be spliced to earlier data. Earlier expenditure data had previously been available in Cansim matrices 2782 to 2791 and in the Statistics Canada publication *Public Finance Historical Data* (68-512). In conversations with one of the authors, Statistics Canada strongly recommended that the earlier data not be used and noted that it was to prevent the use of these data that they had been deleted from the Cansim database. All references to *Public Finance Historical Data* (68-512) have also been deleted from the Statistics Canada Web site. The authors also found serious differences between the currently available data and the older series for the years in which the two data series overlapped. Given this evidence, and the views of Statistics Canada, the authors do not believe it to be proper to extend the sample by employing earlier data.

¹⁰Note that the time span of the sample used here is longer than the time span used in the two most closely related US studies — Fosset and Wyckoff (1996) and McCarty and Schmidt (1997).

¹¹All values are in 1992 constant dollars.

¹²Although real per capita health spending has trended upwards since the mid-1990s, in general, the real per capita expenditure data illustrated in Figures 1 and 2 appear to show little evidence of non-stationarity. Formal testing for non-stationarity is not feasible given the short time span of the data as tests for non-stationarity (even those designed specifically for panel data) have very low power in time series of this length (see, e.g., Karlsson and Löthgren 2000).

¹³These correlation coefficients are calculated using individual data for all ten provinces rather than data averaged across the provinces. That is, each correlation coefficient is calculated using 160 observations on each variable, 16 years of data for each of the ten provinces.

¹⁴Government spending is likely to be persistent due to delays in budget preparation as well as to contracts and institutional factors that make rapid changes to program expenditures difficult. Further, voters may be slow to recognize the need for, or to accept, change, and this may cause governments to adjust program spending slowly.

¹⁵This method of testing crowding out is similar to that used in the two US studies noted in the introduction (Fosset and Wyckoff 1996 and McCarty and Schmidt 1997) as well as that used by Brazer and McCarty (1987) and Marlow and Shiers (1999). As an alternative to the approach taken here, some might consider examining crowding out using expenditure shares rather than real per capita spending. Expenditure shares, however, must sum to one, whether all expenditures are increasing, or all decreasing, or whether they are moving in different directions. Any increase in the share of expenditure on one good, for whatever reason, must necessarily lead to a fall in the share of expenditure on another good. Shifting shares do not necessarily have any importance from a welfare or policy perspective. To be relevant from a welfare and policy perspective, crowding out must imply that expenditure levels (or shares) differ from the values that maximize the relevant objective function. As shares of spending can rise or fall for many reasons that are con-

sistent with maximization, and because shares must sum to one, simply observing that the share of spending on one good has fallen is not particularly significant. Further, welfare generally follows from the quantity of goods and services provided, rather than the share of spending on each good. Thus, in examining real per capita spending, the objective is to relate crowding out to a quantity that more closely affects individual welfare. (The influence of spending on shares exists, but is implicit.) Finally, although the existing empirical literature on crowding out is small, we are not aware of any study that empirically analyzes crowding out using shares or, in fact, that uses an empirical test of crowding out that is fundamentally different from that used here.

¹⁶While equation (1) allows other spending to depend on current health spending, equation (2) does not allow current health spending to depend on current other spending. This asymmetry is imposed in order to focus the analysis on its principal purpose — to determine whether health expenditures are crowding out other types of expenditures. If the interaction of all types of expenditures were of interest, a VAR approach might be more appropriate. However, such an approach, if it incorporated even a small number of other variables, would involve the estimation of a much larger number of parameters. While the VAR model approach is potentially interesting, it is suited to a broader and different question than the very specific question addressed here.

¹⁷Since the α parameters are identified through the estimation of equation (2), the parameter β_H is identified by the variable(s) that appear in equation (2), but which do not appear in equation (1). Without the inclusion of at least one variable in (2) that is not in (1), it would not be possible to distinguish separate β_H and β_2 parameters. Use of two-stage least squares, as an alternative estimation methodology, yields almost identical results.

¹⁸Since these factors are exogenous to the government's choices, they cannot include choice variables such as, for example, tax rates.

¹⁹This constraint is relaxed when alternative specifications are considered. Restricting both X vectors to be the same implies that the β_H parameter in equation (1) is identified by lagged health spending.

²⁰An alternative proxy for the tax base is provincial GDP. However, as many firms have out-of-province own-

ers, GDP may differ significantly from provincial income. Further, GDP for some provinces has a large variance due to movements in resource prices. The substitution of real per capita GDP for real per capita personal income is one of the alternative specifications analyzed in Table 3 below.

²¹See the large literature on intergovernmental grants and the flypaper effect. Oates (1999) provides a survey.

²²The vast majority of transfers consist of unconditional equalization grants and specific purpose transfers that were determined by the Established Program Financing (EPF) and Canada Assistance Plan (CAP) regimes until being replaced in 1995/96 by the Canada Health and Social Transfer (CHST). Only CAP funding, amounting to about one-quarter of the total in 1994/95, had conditions constraining the use of the funds (and the cap-on-CAP payments for Alberta, British Columbia, and Ontario greatly limited the impact of this conditionality). Only recently (since 2000/2001), and then only in very minor amounts (less than 4 percent of transfers), have transfers been specifically designated for and tied to health expenditures. Starting in 2004/2005, after the end of the sample period used here, the CHST was split into the Canada Health Transfer and the Canada Social Transfer. For information on federal-provincial transfers see the Canadian Tax Foundation, *Finances of the Nation*.

²³Alternative age groups were also employed as indicated in Table 3 and discussed below.

²⁴Variables, such as the extent of urbanization and population density, which may affect the demand for government expenditure, are likely to be relatively constant across the short sample used here and so are likely to be well represented by (and very co-linear with) the fixed effects. While fixed effects in a dynamic panel lead to biased estimates of the parameters, this bias goes to zero as the number of observations rises and even with only 15 observations for each province, the bias is relatively small (see Arellano 2003, 84-86). Further, Monte Carlo evidence indicates that, while the parameter associated with the lagged dependent variable may be biased, the bias in the other parameters tends to be quite small (see Islam 2000, 319, for example).

²⁵Five political parties held power at the provincial level during the sample period: the Liberal Party, the New Democratic Party, the Parti Québécois, the Progressive Conservative Party, and the Social Credit Party.

²⁶The log-log specification is commonly used in the health expenditure literature. See, for example, Di Matteo and Di Matteo (1998) and Ariste and Carr (2003).

²⁷The t-statistics have been calculated using heteroscedasticity consistent standard errors. Given the log-log form of the estimating equations, the estimated parameters can be interpreted as elasticities. To conserve space, the estimated coefficients associated with the constant and the province and political party dummy variables have not been reported. These estimated coefficients are available from the authors, but none appear to be nonsensical or particularly noteworthy.

²⁸It is possible, given the short time span of the sample, that a large part of the demographic effects on spending will be reflected in the province dummy variable coefficients since demographic factors are unlikely to vary significantly within a province over such a short period. The insignificant effect of the proportion of old in the population is consistent with the results in Ariste and Carr (2003), who use a sample from 1966 through 1998, but not with Di Matteo and Di Matteo (1998) who use data only through 1991.

²⁹The estimated coefficients of the *health expenditure* equation are the same as in Table 1 due to the recursive nature of the model.

³⁰Although only significant in the *health expenditures* equation, the negative coefficient associated with *debt charges* in all four expenditure equations suggests that *debt charges* may crowd out other types of expenditures.

³¹As a check of the robustness of the results, the data for *all other expenditures* were disaggregated into four alternative subcategories of expenditures: social assistance expenditures, kindergarten to grade 12 expenditures, postsecondary expenditures, and a new residual expenditure category. The estimates were essentially unchanged.

³²From the marginal effects reported in Table 1, it can be seen that the implied effect of a one-dollar increase in *health expenditure* on *all other expenditures* is \$0.46 in the short run and \$0.68 in the long run. These effects are positive and relatively large — not negative as required if crowding out had occurred.

³³This is not surprising as the added variables (school age population — ages 5 to 24 — elementary and sec-

ondary school population — ages 5 to 17 — the unemployment rate, government services price variables, and a trend variable) were statistically insignificant in most cases. If real per capita GDP is used in place of *personal income*, the estimated coefficients and their significance are almost unchanged except that the real GDP variable is insignificant in the *all other expenditures*, *social service expenditure*, and *residual expenditures* equations. If the *transfers* variable is split between general and specific transfers, the coefficients on the two types of transfers are similar in magnitude and the results are unchanged, except that the two transfers variables are insignificant in the *health expenditure* equation.

³⁴Another possible alternative specification is to add, as explanatory variables in the *all other expenditures* equation of Table 1 or the *education expenditure* equation of Table 2, the log of the ratio of provincial government transfers to school boards to total school board revenue (to capture changes in school finance during this period) and the log of per capita postsecondary tuition revenue. In this case, the tuition variable is never significant, although the school board transfer share variable is positive and significant in the *education expenditure* equation. The health-spending coefficient in the *all other expenditures* equation of Table 1 and the *residual* and *social services* expenditure equations of Table 2 are unaffected by this change. In contrast, the *health expenditure* coefficient in the *education expenditure* equation of Table 2 becomes positive and significant. Thus, the addition of these two variables also provides no support for the crowding-out hypothesis (although this result should be interpreted with caution as these two variables may be endogenous to the provincial governments' spending choices).

³⁵This conclusion is consistent with the conclusion of Scott (2004). Also, the US studies cited in the text found no evidence of crowding out among various types of government expenditures.

³⁶Calculated using data for provincial government finances (Cansim II, Table 3850001) as well as data for population (V466668) and a price index (V691784).

³⁷Between 1995/96 and 2003/04, aggregate provincial government real debt-service costs fell 24.3 percent and, as a percentage of total provincial government expenditures, fell from 13.5 to 9.0 percent. In contrast, from 1988/

89 to 1994/95, provincial government real debt-service expenditures rose 50 percent and, as a percentage of total provincial expenditures, rose from 10.1 to 13.2 percent.

³⁸During the final eight years of the sample, real personal income per capita grew by slightly more than 9 percent, after remaining almost constant for the first half of the sample. Real aggregate transfers to provincial governments rose by 39 percent from 1997/98 to 2003/04, after having fallen by 18.8 percent from 1988/89 to 1997/98.

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APPENDIX

Variable Definitions and Data Sources

The data that are in real per capita terms were transformed using the population data from Cansim II, series v466983, v467298, v467613, v467928, v468243, v468558, v468873, v469188, v469503, v469818, and the consumer price index (CPI) (1992=100) for each province, Cansim II series numbers: v691807, v691830, v691853, v691876, v691899, v691922, v691945, v691968, v691991, v692014. Fiscal year data are associated with calendar year data from the year that make up the first three-quarters of the fiscal year (i.e., 1988/89 fiscal year data are associated with 1988 calendar year data).

The provincial CPI is used to deflate the government expenditure data for two reasons. First, this transforms the government spending variables into a measure of the opportunity cost of government spending in terms of a basket of consumption goods. Second, the most likely alternative to the CPI, the province-level GDP deflator, is subject to wide swings for some provinces as a result of movements in resource prices and these swings lead to large movements in measured real government expenditures that have little to do with changes in spending. Note that Di Matteo and Di Matteo (1998) also use the CPI.

Provincial Expenditure Variables

Health expenditure. Natural logarithm of real per capita provincial government health expenditures. Current dollar fiscal year provincial government health expenditures for the ten provinces are from Cansim II, Table 3850001, with the data for the individual provinces given by the series v645264, v645330, v645396, v645462, v645528, v645594, v645660, v645726, v645792, v645858.

Social service expenditure. Natural logarithm of real per capita provincial government expenditures on social services. Social service expenditures include expenditures on social assistance, other social services, workers' compensation, and government employee pension benefits. The first two categories account for approximately 70 percent of these expenditures on average. Current dollar fiscal year provincial government social services expenditures for the ten provinces are from Cansim II, Table 3850001, with the data for the individual provinces given by the series v645269, v645335, v645401, v645467, v645533, v645599, v645665, v645731, v645797, v645863.

Education expenditure. Natural logarithm of real per capita provincial government education expenditures. Current dollar fiscal year provincial government education expenditures for the ten provinces are from Cansim II, Table 3850001, with the data for the individual provinces given by the series v645276, v645342, v645408, v645474, v645540, v645606, v645672, v645738, v645804, v645870.

All other expenditures. Natural logarithm of real per capita provincial government expenditures on all goods and services other than health and debt charges. Current dollar fiscal year provincial government total expenditures for the ten provinces are from Cansim II, Table 3850001, with the data for the individual provinces given by the series v645252, v645318, v645384, v645450, v645516, v645582, v645648, v645714, v645780, v645846. The source for the health data is given above. Debt charges are from Cansim II, Table 3850001, with the data for the individual provinces given by the series v645260, v645326, v645392, v645458, v645524, v645590, v645656, v645722, v645788, v645854.

Residual expenditures. Natural logarithm of real per capita provincial government expenditures on all goods and services other than health, social services, education, and debt charges. The sources of the data used to construct this variable are described above.

Explanatory Variables

Personal income. Natural logarithm of real per capita personal income. Current dollar personal income data for the ten provinces are from Cansim II, series v691824, v691847, v691870, v691893, v691916, v691939, v691962, v691985, v692008, v692031.

Transfers. Natural logarithm of total real per capita transfers received by the provincial government from other levels of government. The current fiscal year dollar value of total transfers is the sum of general and specific purpose transfers from other levels of government. Current dollar fiscal year provincial government general purpose transfers received for the ten provinces are from Cansim II, Table 3850001, with the data for the individual provinces given by the series v645250, v645316, v645382, v645448, v645514, v645580, v645646, v645712, v645778, v645844. Current dollar fiscal year provincial government specific purpose transfers received for the ten provinces are from Cansim II, Table 3850001, with the data for the individual provinces given by the series v645251, v645317, v645383, v645449, v645515, v645581, v645647, v645713, v645779, v645845.

Debt charges. Natural logarithm of real per capita provincial expenditure on debt service. The source is given in the description of *all other expenditures* above.

Old. The natural logarithm of the ratio of the provincial population aged 65 and over to the total provincial population. The source for the total population data is given above. The data for the number of people aged 65 and older are from Cansim II, series v467001, v467316, v467631, v467946, v468261, v468576, v468891, v469206, v469521, v469836.

Child. The natural logarithm of the ratio of the provincial population aged 4 and younger to the total provincial population. The source for the total population data is given above. The data for the number of people aged 4 and younger are from Cansim II, series v467199, v467514, v467829, v468144, v468459, v468774, v469089, v469404, v469719, v470034.

Political party dummy variables. A zero-one dummy variable for each of four political parties (Conservative, NDP, Parti Québécois, Social Credit) equal to one when the party was in power for the majority of the calendar year and zero otherwise. Dates of elections and the victorious party were taken from individual provincial government Web sites.

Sources for the Data Used in Table 3 to Check the Robustness of the Results

Real gross domestic product. Data on current dollar provincial gross domestic product at market prices are taken from Cansim II, series v687191, v687203, v687215, v687227, v687239, v687251, v687263, v687275, v687287, v687299. These data are deflated using the GDP price indices from Table 3840036, series v3840622, v3840651, v3840680, v3840709, v3840738, v3840767, v3840796, v3840825, v3840854, v3840883.

Percentage school age. The natural logarithm of the ratio of the number of people aged 5 through 24 to the total population. The source of the total population data is described above. The number of school-aged

individuals is given by the sum of those aged 0–17 and 18–24 minus those aged 0–4. The data source for those aged 0–4 is described above. The data for those aged 0–17 and 18–24 are from Cansim II, series v467280, v467595, v467910, v468225, v468540, v468855, v469170, v469485, v469800, v470115, v467295, v467610, v467925, v468240, v468555, v468870, v469185, v469500, v469815, v470130.

Unemployment rate. The natural logarithm of the official unemployment rate for those aged 15 and over by province. Source: Cansim II, series v2170417, v2170633, v2170849, v2171065, v2171281, v2171497, v2171713, v2171929, v2172145, v2172361.

Relative prices of government services. All government price variables are relative to the CPI and the natural log taken of the ratio. For the expenditure variables: *all other expenditures*, *residual government expenditures* and *social service expenditures*, the price index for government current expenditure on goods and services was employed. These data were taken from Cansim II, series v3840600, v3840629, v3840658, v3840687, v3840716, v3840745, v3840774, v3840803, v3840832, v3840861. For education spending, the education price index was employed. This was taken from Cansim II, series v1026901, v1026917, v1026933, v1026949, v1026965, v1026981, v1026997, v1027013, v1027029, v1027045. This index was not available for the last two years of the sample and so was updated using the percentage change in the government expenditure price index. The price of health care was represented by the health-care services price index available in Cansim II, series v735703, v735837, v735972, v736107, v736243, v736379, v736515, v736651, v736786, v736922.