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# TAX CREDITS AND THE USE OF MEDICAL CARE

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## ABSTRACT

Several recent proposals have advocated using the income tax system to collect user fees to help fund the health care system. While there is a considerable amount of research investigating both how individuals respond to tax incentives for employer provided health insurance and on the effects of user fees payable at the point of service on the use of health care services, there is limited evidence on how individuals respond to tax incentives when these are not realized until taxes are paid.

This paper uses existing exemptions in the Canadian tax code that allow individuals to deduct the cost of health care or health insurance from their taxable income in order to identify the tax price elasticity of demand for health care when price changes are realized at the end of the tax year. Our results suggest that despite not realizing the tax benefit at the time of purchase, individuals are quite responsive to changes in the tax price of health care. Our elasticity estimates for a wide range of health care products are well within the range of traditional price elasticity estimates, including in particular our estimates for prescription drugs. We also find some evidence that suggests individuals trade off risk sharing through traditional insurance companies with risk sharing through the tax code. That is, as the tax price of health care decreases, individuals spend more on health care, but spend less on health insurance.



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## 1. Introduction

The tax system is one of the primary tools by which governments provide assistance to people with high health expenditures. In the United States, Canada, and elsewhere, governments exempt employer-provided health care benefits from taxable income, thereby subsidizing the purchase of health insurance through the workplace. The U.S. government has developed other mechanisms by which individuals can shelter the cost of medical expenses from taxes including Section 125 plans and Archer MSA accounts. Recently, debate surrounding the growing number of uninsured in the U.S. has focused on refundable tax credits as a mechanism for extending insurance coverage to the uninsured (Goodman, 1999).

In Canada several proposals have recently emerged which would use the tax system as a mechanism for collecting benefit taxes for the use of health care services. Such proposals either suggest the inclusion of health care services as taxable income (Kent, 2000), the use of the tax system to collect fees on a percentage of health care spending scaled by taxable income (Aba, Goodman, and Mintz, 2002) or a tax credit against which health care expenses would be deducted (Reuber and Poschmann, 2002). Proponents of these plans argue that the existing tax structure would facilitate the administration of benefit taxes for health care, and would also allow the government to easily identify and exempt those populations that are likely to

be unable to pay the benefit taxes. In every case, the response to such plans, whether they be to insure the uninsured, or to collect benefit taxes, hinges on how responsive individuals are to tax incentives.

A considerable volume of previous research has investigated how individuals respond to tax incentives for health insurance purchased through an employer (see Gruber, 2001 for a review of the literature). There is also a growing consensus among economists about how user fees payable at the point of service affect the use of health care services (Glied and Remler, 2002). However, there is far less evidence on how individuals respond to tax incentives when these benefits are not realized until taxes are paid. Despite the fact that many countries allow individuals to deduct some portion of their direct medical expenses from taxable income, the elasticity of demand for medical care and medical insurance in such contexts remains at best poorly understood.

This paper uses the existing tax treatment of medical expenditures in Canada in order to identify the tax price elasticity of demand for health care when price changes are realized at the end of the tax year. We exploit variation in the tax price of health care both within Canadian provinces over time and across individuals within provinces to identify how individuals respond to tax incentives reducing the price of both health care and health insurance.

Our results suggest that individuals are quite responsive to changes in the tax price of health care, even though the tax benefits are not realized at the time of purchase. Our elasticity estimates for a wide range of health care products are well within the range of traditional price elasticity estimates, as are our elasticity estimates for spending specifically on prescription drugs.

One notable feature of the Canadian system is that the tax credit applies equally to taxpayers' out-of-pocket medical expenses and to premiums for private health insurance plans. As such, the system leaves the relative price of market insurance and self-insurance unchanged, and individuals' demand for insurance could either rise or fall, depending on second-order risk tolerance considerations. Consistent with this view, we find some evidence of a negative effect of the tax subsidy on private insurance premiums. That is, as the tax price of health care decreases, individuals spend more on health care, but spend less on health insurance.

The rest of the paper proceeds as follows. Section 2 reviews the previous literature on tax subsidies and cost sharing in health insurance. Section 3 explains the workings of the medical expense tax credit in Canada. Section 4 describes the data used in the analyses. Section 5 outlines our empirical strategy. Section 6 presents our results and section 7 offers some conclusions.

## 2. Previous Literature

Through extensive empirical research, economists have developed a good understanding of how cost sharing affects health care utilization. Most of the literature focuses on two areas. The first estimates the price elasticity of demand for health care. The most comprehensive study estimating the price elasticity of demand for health care remains the RAND health insurance experiment (Newhouse, 1993) which finds significant differences in the use of health care services depending on the out-of -pocket price at the time of use. Elasticity estimates in the RAND experiment are on the order of –0.2. A second branch of the literature has examined the price elasticity of demand for health insurance. Here, most researchers examine the demand for employer-provided health insurance using variation in the tax-price of insurance to identify the demand for insurance. For example, Gruber and Poterba (1996) use variation created by the 1986 US Tax Reforms to examine changes in the demand for insurance among the self-employed. Stabile (2001) and Finkelstein (2001) use variation across and within provinces in Canada to identify the price elasticity of demand for supplemental employer-provided health insurance. In all cases, estimates of the price elasticties are generally significant, but inelastic, ranging from –0.2 to –0.7.[1]

[1] Previous work has also examined the effects of deductibles on the demand for medical care services (Keeler et al., 1977, Newhouse et al., 1980). The theoretical work shows that consumers who expect to exceed the deductible in a given payment year will behave as though they do not face a deductible, whereas those who do not expect to exceed the deductible will behave similarly to a an uninsured individual. (Keeler et al., 1977).

These estimates have, directly or indirectly, informed a more recent policy literature examining the potential role for Medical Savings Accounts in the health care system. Such accounts would involve employers or governments providing a fixed amount of money to individuals each year for health care services. Individuals would then be free to allocate these funds as they see fit. Once the account maximum is reached, individuals are either covered by catastrophic health insurance or face some "spending corridor" for which all costs are paid out of pocket before catastrophic insurance kicks in. In the event that the full account balance is not used in a given year it can either be rolled over for future use or used for other purposes depending on the specifics of the proposal. Variations on these proposals suggest using the income tax system to administer tax credits to apply towards health care (Reuber and Poschmann, 2002) or health insurance spending (Goodman, 1999). While there have been attempts to simulate the effects of this type of cost sharing (Keeler et al, 1996; Eicher, McClellan, and Wise, 1996) these studies generally rely on demand elasticities from the RAND experiment or other sources in the literature and do not directly estimate whether individual behaviour under MSA plans is similar to individual behaviour under traditional cost-sharing arrangements.

A number of policy analysts have advocated using credits or fees administered through the income tax system to help manage health care utilization (see Stabile, 2003 for a general review of such proposals).

However, we are unaware of any previous literature that directly examines the effects of cost sharing for health care services when the costs are not borne at the time of use, but rather at the end of the fiscal year. Evidence from other markets suggests that people may indeed respond differently when they do not faces out-of-pocket costs at the time of use, but instead pay later. For example, Gross and Souleles (2002) find that individuals change their spending behaviour and the debt that they carry on their credit cards with changes in their spending limits. It is therefore quite feasible that estimates of the price elasticity of demand for both health care and health insurance may be quite different depending on when out-of-pocket costs must be paid for. There is also a related literature investigating the effects of tuition credits for post secondary education in the United States. Long (2003) investigates the effects of the Hope and Lifetime Learning Tax Credits which provides aid for college expenses. Like the tax credits investigated here, there is a significant delay between college enrollment and when the tax credit is received. Two results from this literature may be useful for better understanding the behaviour investigated here: first, despite the fact that the tax credit is at the end of year, people still appear to adjust their behaviour regarding educational choices. Long finds that students were more likely to attend more expensive colleges as a result of the tax credit. Second, the take-up of this credit is much lower that might be expected—only one third of

individuals who are eligible for the school credit actually take it up. Both of these findings will be consistent with the analysis we present here.

3. The Canadian Medical Expense Credit

The current system of tax relief for medical expenditures in Canada is based on a non-refundable federal income tax credit for qualifying medical expenditures. Qualifying medical expenditures can be paid by or on behalf of the taxpayer, his or her spouse, and dependant family members, and a claim must be accompanied by receipts. A broad list of expenditures is prescribed in the legislation, including:

i. payments to hospitals, doctors, dentists, and other health professionals for medical services;
ii. expenditures on a variety of medical devices, such as wheelchairs, prosthetic limbs, iron lungs, and so on, as well as hearing aids, dentures, and prescription eyeglasses;
iii. the costs of full-time care in a nursing home or in the patient's own home, including the costs of home renovations for disabled patients;
iv. expenditures on prescription drugs; and
v. premiums paid for private health insurance plans.

As this list suggests, the credit was conceived of by federal authorities as tax relief for taxpayers facing catastrophic health costs and disabilities, but the credit is far more broadly available. In Canada, most health care costs incurred in a hospital or a doctor's office are covered by publicly-funded health insurance. Coverage for these services is first dollar and universal. Despite this coverage, more than 30 percent of health care spending in Canada is privately financed (OECD, 2001). Any portion of these privately financed services not reimbursed by an insurance company is eligible for the tax credit. No services reimbursed by a health insurance plan are eligible. A significant fraction of taxpayers claims the credit each year (just over 10 percent of tax filers in 2000), and tax advisers and health-care providers frequently advise clients on how to take advantage of it.[2]

For the 2000 tax year, the system worked as follows: an individual could claim a credit for 17 per cent for medical expenses in excess of either $1,637 or three per cent of the individual's net income, whichever is less; however, the credit cannot reduce the tax liability below zero. (Since the 17 per cent rate was then the federal tax rate in the lowest income bracket, the non-refundable credit therefore operated exactly like a deduction from taxable income for expenditures over the threshold amount, except that the treatment is more favourable for taxpayers in low brackets than high

[2] For example, an advertisement for one cosmetic surgery practice explains the intricacies of the credit to prospective patients through an example and concludes, "your facelift would qualify for a 22 per cent rebate".

brackets.) Since the 1997 tax year, some claimants have also been eligible for a supplementary credit, equal to 25 per cent of the basic credit amount, up to a maximum (in 2000) of $507. Unlike the basic credit, the supplementary credit is refundable for taxpayers without taxable income, and the supplement is reduced by five cents for each dollar by which the claimant's adjusted net income exceeds $17,664.

The effect of both the basic and supplementary credits is to reduce the after-tax price of health care expenditures, but the precise magnitude of the marginal subsidy is complicated. Figure 1 depicts the notional budget constraints under the various regimes facing a household which chooses a bundle consisting of health care services $H$ and a composite, taxable consumption good $C$. The dotted line, closest to the origin, represents the budget constraint that would apply if health care expenditures were fully taxable, and the household's taxable income were $Y$. The budget constraint for the basic credit regime, which applied prior to 1997, is represented by the line *BEY*: health expenditures in excess of the threshold $H_0$ (which depends on income) are eligible for the federal credit rate. The budget constraint for the supplementary credit regime introduced in 1997 is represented by the line *ADEY*: expenditures between $H_0$ and $H_1$ are eligible for both credit and supplement, while higher amounts are eligible for the credit alone.

Thus the "tax price" of health care expenditures facing each taxpayer depends on the level of expenditures chosen. Importantly for our work,

however, the tax price varies for reasons unconnected with the household's choices. As noted previously, the first threshold level is the lesser of 3 per cent of net income and a dollar amount that has varied annually. The second threshold level is in turn a decreasing function of income, with the maximum supplement fully taxed back for taxpayers with net income over $27,804.

As well, the tax price in both ranges differs among households. In all provinces but Quebec, provincial income tax liabilities have been calculated as a surtax on basic federal tax minus federal non-refundable credits (including the medical expense credit). Consequently, the effective credit rate in these provinces was increased from 17 per cent to 17(1+ *tp*) per cent, where *tp* is the provincial surtax rate, which ranged between 0.44 and 0.62 in 2000, and which have varied in each province over time. In Quebec, provincial tax liabilities are calculated as a function of income rather than federal tax, so that the federal credit does not have a cascading effect on provincial liabilities. However, Quebec operates its own credit and refundable supplement for medical expenditures which has roughly paralleled the federal system, but which is somewhat more valuable than the implicit credits offered by the other provinces.[3] Furthermore, prior to 1987, tax relief for medical expenses was implemented as a deduction rather than a credit. Consequently, for 1986 (the first year in our sample), the effective subsidy

[3] The basic credit in Quebec applies to expenditures in excess of 3 per cent of net income, with no maximum amount for the threshold, unlike the federal credit. The refundable supplement is available only to taxpayers with employment income, and is taxed back in roughly the same way as the federal supplement. Of course, Quebec taxpayers are eligible for the federal credit and supplement on their federal tax liabilities, in addition to the provincial tax relief.

rate was equal to the taxpayer's actual marginal tax rate on income, rather than the low bracket rate that applies under the credit regime.

## 4. Data

We use data from the Family Expenditure Survey (FAMEX) and its successor, the Survey of Household Spending (SHS), from 1986 through 2000. The FAMEX is a cross sectional Canadian data collected approximately every other year. Respondents are asked detailed questions on family income and expenditure, including a module on health care spending. The income and expenditure data are collected for the entire preceding year (so, for example, the 2000 survey is conducted in 2001). Income and demographic data for both the reference person and the spouse of the reference person includes income before taxes, earned income, self-employment income, transfer income, investment income, sex, age, marital status, and number of children. (Questions on educational attainment of respondents were discontinued in 1997.) Health care expenditures include direct health care expenditures for the household (such as medical and dental services, prescription and over the counter drugs), spending on health insurance premiums not reimbursed by government or employer-provided health plans, and so on. All expenditure amounts are collected for the family as a whole, which is also the unit for

which expenditures are eligible for credit under the Medical Expense Tax Credit.

We calculate detailed tax information for all the observations in our sample. Tax information is based on the income and demographic information available in the FAMEX and SHS surveys and is calculated using a Canadian tax rate calculator developed by Kevin Milligan at the University of British Columbia. Tax information includes the individual's marginal tax rate, average tax rate, and total tax burden. In addition to this information we construct a module to provide us with the marginal tax price of health care under the medical expense tax credit (which is different from the individual's marginal tax rate on earned income), the dollar thresholds at which each household begins and ceases receiving the credit and supplement, and the tax price of the first dollar of creditable expenditure.

We report means and standard deviations for the main variables in the sample (calculated for all survey years) in Table 1. Mean health care expenditure is $1025 in 1991 Canadian dollars. The mean expenditure on health insurance premiums is $322. Total expenditures for the entire family averaged $43,149. Average individual income is $26,959, and the average tax price in the sample, including all individuals who do not qualify for the credit and hence have a tax price of 1, is 0.907. The average tax price for the sub-sample of individuals who qualify for the credit is 0.714. Forty percent of families in our data have sufficient health care spending to qualify for at

least $1 of credit, however it is very unlikely that anyone who only qualified for a $1 credit would go through the effort of claiming the medical expense tax credit on his or her return. Imposing a cutoff of, say, $50 in tax reduction as a requirement for applying for the credit, and restricting the sample to those who actually owe taxes, 16 percent of families in our data would receive the credit. This number is almost identical to the numbers given in the government's aggregate taxation statistics, which report that approximately 15 percent of filers with taxable incomes apply for the credit (Canada Customs and Revenue Agency, 2002).

Who takes up the medical expense credit? The Canadian Customs and Revenue Agency provides information on take-up of the credit by individual income group for the 2000 tax year. We report these rates as a fraction of either total returns or taxable returns in the first two columns of table 2. Unfortunately we have no way of knowing what percent of individuals actually take-up the credit as a fraction of those *eligible* for the credit. Take-up rates decline with income, primarily due to the income scaled threshold. The threshold reaches its maximum at approximately $53,000 in taxable income and, as shown in Table 2, the take-up rate also appears to level off at about 5 percent at and above $60,000.

We report take-up in the FAMEX in two ways: first we include all families whose health care spending exceeds the minimum threshold for a credit, and second we impose a minimum claim of $50 (and hence a tax price

less than 1) in order to be counted as taking-up the credit. This second method is comparable to the second column of Table 2, but will underestimate take-up for low-income families in our sample. Take-up rates also decline in the FAMEX data, although the declines are less pronounced. While it is difficult to fully understand who takes up the credit and why, the most likely causes of the discrepancy between suggested take-up in the FAMEX and the actual take up rates are that individuals are either not aware that the credit exists, or do not take the steps required to file for the credit. Both of these causes would bias against us finding a significant tax-price elasticity of demand for medical care.

Finally, as noted above, any individual within the family can claim health care expenditures for the entire family. In order to maximize the benefit, the lowest income individual for whom the whole credit can apply should claim the credit. In our analysis, however, we assume that the primary survey respondent is the individual who claims the credit. This assumption would again bias against us finding a significant tax-price elasticity of demand for medical care.

## 5. Empirical Strategy

Our analysis exploits variation in the individual tax price generated in four ways, as outlined above. First, there are changes within provinces over

time generated by changes in provincial income tax rates. Second, there is a large change in 1987 from tax deductions to tax credits, which significantly increased the tax price of medical care by different amounts depending on the individual's federal tax bracket. Third, Quebec's separate tax collection program offers provincial credits for medical credits which are higher than those in other provinces and which also changed over time. Fourth, supplemental tax credits for medical care expenses were added to the tax code in 1997, the amount of which differs by income, province, and year. While we exploit all these sources of variation, we have also re-estimated our models excluding each source of variation separately to ensure that our analysis is not being driven by one source of variation in particular.

We pool the eight years of data and estimate models of the form:

$$\log(H_{it}) = \alpha + \beta(tax\ price)_{it} + \delta X_{it} + \gamma \Pr ov_i + \pi Year_t + \varepsilon_{it} \quad (1)$$

where the dependent variable, the log of health spending, takes on four values: total health care spending, direct health costs to households (all spending minus spending on health insurance premiums), spending on health insurance premiums, and spending on prescription drugs in particular. We use log spending to help normalize the distribution of health care spending, but our results are not sensitive to using levels instead of logs. Since almost no households have zero spending in any of the four categories (the exception

being health insurance premiums) we lose very few observations from moving from levels to logs. While all four of these spending categories are broadly eligible for tax credits, and hence should respond to changes in the tax price,[4] we are particularly interested in the last two—health insurance premiums and prescription drug spending—since these are more directly comparable to estimates from previous studies. *Tax price* is our calculated tax price of medical spending. *X* includes a quartic polynomial in income and a quadratic in age, as well as sex, marital status, number of children, and total expenditure by the household. *Prov* are province fixed effects and *Year* are year fixed effects which are included in all specifications.

The tax price calculated for each household is a function $P_{it}(H_{it})$ that is endogenous to the health care spending decision $H_{it}$. A household spending more than the eligibility threshold faces a lower tax price than an otherwise identical household spending less than the threshold; similarly, a household with spending in excess of the amount eligible for the supplement faces a lower tax price than one in the supplement range. We use two strategies for dealing with the endogeneity of the tax price. First, primarily for comparative purposes, we examine only those households whose spending exceeds the household's threshold level to qualify for the medical tax credit. Examining this selective sample provides some information as to the source of variation in spending behaviour. Specifically, it allows us to check whether we are

[4] There are some minor expenses reported in Famex/SHS that are not eligible for the tax credit (Hawley, 2001). The health insurance premiums and prescription drug categories, however, do not include any such expenses.

identifying our estimates purely based on the difference between individuals who do and do not receive a tax credit, or whether there is further identification to be gained by those individuals who exceed the credit threshold.

Our second method for dealing with endogeneity is to construct two instruments for the tax price of medical care. The first is the change in the tax price from the previous year, $P_{it}(H_{it}) - P_{it-1}(H_{it})$. This amounts to holding constant all the individual characteristics, including medical spending, and taking the difference in the tax price generated only through changes in the tax laws between years *t-1* and *t*. Of course, this remains a function of observed health spending $H_{it}$, but it is apt to be uncorrelated with spending in the absence of a behavioural response, because of the extreme non-linearity of the tax price function and the tendency for tax reforms over our sample period to affect tax prices at different parts of the health spending distribution. What is particularly attractive about this instrument is that it not only picks up the variation within province over time, it also varies across households within a province based on a fixed set of individual characteristics.

The second instrument is the household's first dollar tax price of medical care, calculated as the tax price of medical care an individual would receive for the first dollar of spending above his or her individual threshold. In this case, the instrument is completely independent of the household's

actual health care spending behaviour, but varies within provinces over time. It also varies with family income within a province for the 1986 year, since the measure was then a tax deduction rather than a credit, and from 1997 onwards when some low-income families were eligible for a supplemental credit. However, for the majority of our sample, this instrument is independent of both health care spending and income, and fixed within a province/year cell. We present estimates using each of these instruments separately, and then using them together. Overidentification tests suggest that the inclusion of the additional instrument is valid. First stage results for the instruments are reported in notes to the tables. Given that the instruments are constructed to be highly correlated with the actual tax prices, they perform extremely well in the first stages.

## 6. Results

We begin by presenting results from estimates of equation (1) by OLS. These estimates use the full sample. The coefficients on tax price suffer from endogeneity bias, but are a useful starting point for comparative purposes. The first column of Table 3 reports the results using all health care spending as the dependent variable. Our results suggest a large and significant negative relationship between the tax price of medical care and health care spending. The quartic in income does a reasonable job of fitting the

relationship between income and health spending, with higher income households spending more on health care. Married couples and families with more children have higher health care expenditures.[5] The estimate on the tax price of medical care, which translates into an elasticity of approximately –2.9 is clearly too large to be plausible, primarily because these estimates reflect the fact that individuals with higher health spending will also have a lower tax price of medical care.

Columns two through five of Table 3 report similar results for direct health care expenditures, health insurance expenditures, and prescription drug expenditures. Income remains positively correlated with health spending for both direct health care costs and health insurance spending. However, there is a negative correlation between income and prescription drug spending. This result may reflect the fact that income is strongly correlated with having supplemental drug insurance in Canada. If high income individuals are more likely to have their prescriptions paid for by an insurance company, then lower income individuals will appear to spend more out of pocket on prescription drugs. The tax-price coefficients on health insurance premiums and prescription drug expenditures are considerably smaller, as would be expected given that they are a subset of total health care costs. However, the elasticity estimates, -1.4 for health insurance spending and -1.26 for prescription drug expenditure, are still larger than most

[5] We re-run all specifications while excluding families with children. Our results in that case are very similar to those reported here.

estimates in the literature. This is surely due to the endogeneity of the tax price. To account for this we turn now to estimates which either restrict the sample to those who have spending above the individual threshold for the medical expense tax credit, or which instrument for the tax price.

As noted above, once spending on health care exceeds the credit eligibility threshold determined by income, and year, the tax price of medical care is only weakly and *positively* related to health care spending. (Once the maximum threshold for the supplement has been exceeded, the tax price is independent of spending.) Therefore, it is possible to examine whether individuals who are already heavy health care spenders respond to changes in the tax price of medical care. The results are presented in Table 4. Estimates for all four measures of health spending remain negative and highly significant. Of particular interest are the estimates of the effects of tax price on health insurance spending and on prescription drug spending, presented in columns 3 and 4. Here the coefficient estimates are considerably smaller than those obtained using the full sample. Using the mean tax price for the conditional sample (0.71), the estimated elasticity for health insurance spending is -0.25 and for prescription drug spending the elasticity estimate is –0.24. These results are much more in keeping with estimates of the price elasticity of medical care when the price is paid at the point of service (see Newhouse, 1993, Gruber and Poterba, 1994, Stabile, 2001). While we are ultimately interested in elasticities for the entire sample and not just the

sub-sample of high health care spenders, these results do suggest that part of our identification is coming from spenders above the threshold levels.

We next turn to presenting estimates using the two instruments for the tax price of medical care: the difference in tax prices between *t-1* and *t*, and the first dollar marginal tax rate. The first instrument relies on changes in the tax price over time, holding health care spending and income constant. The second instrument is independent of health care spending and, for most households in the sample, independent of income as well. Table 5 presents IV results using the difference in tax price as an instrument. Controlling for the endogeneity of the tax price produces estimates of the elasticity of demand for medical care at tax time that are in keeping with point of service estimates in the literature. The elasticity of demand for prescription drug spending is –0.46, similar to the range of estimates for prescription drug spending in both Canada and the US (Zweifel and Manning, 2000). Using the first dollar marginal tax price (Table 6) yields a slightly smaller, but still significant elasticity estimate of –0.27, and using both instruments to over-identify the coefficients yields a similar estimate of –0.29. As noted above we can not reject the over-identification test of the additional instruments. Other coefficients are similar in magnitude to their OLS counterparts.

That these estimates are so similar to the previous literature is somewhat surprising.[6] There are a number of reasons to believe that individuals would be more sensitive to changes in the price of health spending when they pay for those services at the time of use, rather than some months later, at tax time. Our estimates strongly reject this, however, with consistent evidence of a negative and significant price elasticity in the range of -.027 to -0.46 under our instrumental variables specifications.

The estimates for private health insurance premiums are particularly striking. Using the change in tax price between *t* and *t-1* as an instrument produces a positive and significant elasticity estimate for health insurance spending (Table 5, column 3): an increase in the tax subsidy causes demand for health insurance to fall. (All elasticity estimates for other spending categories remain negative and significant.) The result is surprising but is in fact not inconsistent with optimizing behavior by taxpayers. Since both health insurance premiums and out-of-pocket expenditures are eligible for the credit, the tax law leaves the relative price of market health insurance and self-insurance unchanged. Consequently, the choice between the two is affected by tax rules only to the extent that changes in after-tax income change taxpayers' capacity for risk tolerance. A decrease in an individual's tax rate in a proportional tax system (and hence an increase in the tax price of health care) should cause the demand for health insurance to rise when the

[6] As specification checks we re-run all of the analysis omitting Quebec and omitting the 1986 data (before the deduction turned into a credit) to ensure that neither of these single sources of variation are driving our results. The results remain quite similar in both cases.

individual displays increasing relative risk aversion, and demand should be unaffected in the central case of constant relative risk aversion. Indeed, our particular result is in keeping with recent findings by Cutler (2002), who finds evidence that recent increases in the total premium costs of health insurance in the US have lead to increases in health insurance take-up. Using our alternate the first dollar marginal tax rate instrument for the tax price, however, reverses the sign of the estimate (Table 6). Combining the two instruments, the coefficient estimate (and hence the elasticity) is once again positive, but not quite significant at the 10 percent level (Table 7). Therefore, while there is some evidence that individuals may trade off insurance spending for risk sharing in the tax system, the evidence is not completely robust to the choice of instrument.

## 7. Discussion and Conclusions

We use the existing tax treatment of medical expenditures in Canada in order to identify the tax price elasticity of demand for health care when price changes are realized at the end of the tax year. Our findings suggest that individuals respond to the tax credits in much the same fashion as they do to variation in prices at the point of service. In fact, in our preferred instrumental variables specifications we find price elasticities in the range of –0.27 to –0.9 across different categories of medical care spending, well within

the range of price elasticites reported in the literature. For prescription drug spending in particular, our findings are quite similar to those found in the RAND health insurance experiment (Newhouse, 1993), which found little difference in price responsiveness between prescription drugs and other forms of medical care.

Since both health insurance premiums and out-of-pocket expenditures are eligible for the credit, the tax law leaves the relative price of market health insurance and self-insurance unchanged. We find some evidence that increases in the tax price lead to increases in spending on health insurance, consistent with individuals displaying increasing relative risk aversion.

Our findings support the view advanced by some policy-makers that the income tax system can be an effective method of influencing the use of health care services. In the Canadian context, our results suggest that benefit taxes collected at tax time would have effects similar to user charges at the point of service. However, in the former case, low-income individuals who know they will not be subject to benefit taxes would not be deterred from using services. In the U.S. context, our results suggest that tax credits for items such as prescription drugs are likely to be effective and promoting prescription drug spending in providing some relief from high drug costs.

One qualification to our results is that we estimate that more high-income households should be claiming the medical care expense credit than actually do. We estimate that 21 percent of households with incomes over

$50,000 qualify for the credit, yet Canada Customs and Revenue Agency suggests that only 6 percent of tax filers with taxable returns in this income group actually do claim the credit. Low take up is by no means unique to this program. The Medicaid program has long experienced low take-up rates despite numerous efforts to inform eligible families of about the program (Aizer, 2003). We suspect that the reason for low take up rates in the Canadian case is that it can be cumbersome to collect and retain the receipts necessary to make a claim. Further, some families might not anticipate that annual expenditures will be high enough to qualify for the credit until part way through the year, so that they would not begin to collect receipts until it is effectively too late. Of course, the failure of some eligible households to claim the credit should work against finding tax responsiveness in the data. Nevertheless, we find robust evidence of significant price elasticities in our estimates.

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Table 1: Means

| Variable | Mean | Standard Deviation |
|---|---|---|
| Total Health exp | 1025.001 | 1133.16 |
| Direct health care costs | 702.22 | 926.06 |
| Health Insurance Premiums | 322.78 | 531.10 |
| Prescription Drugs | 184.25 | 401.77 |
| Tax Price | 0.907 | 0.142 |
| Change in Tax Price | -0.002 | 0.039 |
| First dollar MTR | 0.179 | 0.148 |
| Income | 26959.78 | 21949.68 |
| Age | 48.21 | 16.307 |
| Male | 0.5353 | 0.498 |
| Married | 0.618 | 0.485 |
| Number of Kids | 0.613 | 0.955 |
| Total Expenditure | 43149.47 | 29318.54 |
| Threshold for credit eligibility | 592.610 | 583.947 |
| | | |
| % of people above threshold | 66% | |

Source: FAMEX and SHS 1986-2000.

Table 2:
Take-Up of the Medical Expense Tax Credit in 2000

| Group | Take-Up as a Percent of All Tax Filers | Take-Up as a Percent of Taxable Returns | Predicted Take up in FAMEX—all individuals | Predicted Take-up in FAMEX—Tax Price<1 and $50 min credit |
|---|---|---|---|---|
| All income levels | 10% | 15% | 41% | 16% |
| 15-20 K | 20% | 24% | 51% | 21% |
| 20-25 K | 18% | 19% | 47% | 25% |
| 25-30 K | 15% | 15% | 44% | 26% |
| 30-40 K | 12% | 12% | 38% | 24% |
| 40-50 K | 8% | 8% | 31% | 21% |
| 50-60 K | 6% | 7% | 28% | 20% |
| 60-70 K | 5% | 5% | 24% | 17% |
| 70-80 K | 5% | 5% | 27% | 20% |
| 80-90 K | 5% | 5% | 25% | 19% |

Columns 1 and 2 taken from the CCRA (2003). Columns3 and 4 are authors' calculations using the 2000 SHS.
Column 4 is calculated by imposing a minimum claim of $50 on individuals in order to be counted as taking up the medical expense credit.

Table 3: OLS Full Sample

| | All health care expenditures | Direct Costs to Households | Health Insurance Premiumns | Prescription Drugs |
|---|---|---|---|---|
| Tax Price | -3.20** | -2.71** | -1.56** | -1.42** |
| | (0.025) | (0.027) | (0.028) | (0.035) |
| Income | 1.0E-6** | 3.52E-6** | 2.30E-6** | -0.00001** |
| | (7.2E-7) | (7.93E-7) | (8.40E-7) | (1.05E-6) |
| Income^2 | -1.47E-10** | -3.74E-11** | -3.89E-12 | 1.35E-10** |
| | (1.46E-11) | (1.59E-11) | (1.62E-11) | (2.14E-11) |
| Income^3 | 3.81E-16** | -4.95E-17 | -1.33E-16 | -4.47E-16** |
| | (9.21E-17) | (1.01E-16) | (9.91E-17) | (1.37E-16) |
| Income^4 | -2.87E-22* | 2.11E-22 | 3.15E-22* | 4.04E-22 |
| | (1.66E-22) | (1.81E-22) | (1.73E-22) | (2.41E-22) |
| Age | 0.0099** | 0.0087** | 0.023** | 0.021** |
| | (0.0014) | (0.0015) | (0.0018) | (0.0020) |
| Age^2 | 0.00010** | 0.00012** | -0.00016** | 0.00001 |
| | (0.00001) | (0.00001) | (0.00002) | (0.00002) |
| Male | -0.150** | -0.148** | -0.00094 | 0.059** |
| | (0.0077) | (0.0085) | (0.0094) | (0.011) |
| Married | 0.483** | 0.429** | 0.308** | 0.265** |
| | (0.0084) | (0.0092) | (0.010) | (0.012) |
| Number of Kids | 0.022** | 0.050** | 0.028** | -0.030** |
| | (0.0040) | (0.0044) | (0.0049) | (0.0058) |
| Total Expenditure | 0.00001** | 0.00001** | 0.00001** | 0.00000** |
| | (0.00000) | (0.00000) | (0.00000) | (0.00000) |
| Constant | 7.19** | 6.45** | 5.85** | 4.93** |
| | (0.046) | (0.050) | (0.056) | (0.066) |
| R-squared | 0.367 | 0.268 | 0.239 | 0.138 |

Source: FAMEX and SHS 1986-2000. Standard errors in parentheses. All specifications include year and province dummies. The dependent variables are in logs. ** denotes significance at the 5% level and * denotes significance at the 10% level.

Table 4: OLS for families with expenses above the eligibility threshold

| | All health care expenditures | Direct Costs to Households | Health Insurance Premiumns | Prescription Drugs |
|---|---|---|---|---|
| Tax Price | -1.55** | -1.20** | -0.356** | -0.331** |
| | (0.032) | (0.036) | (0.038) | (0.048) |
| Income | 0.00003** | 0.00002** | 0.00002** | 1.50E-6 |
| | (0.00000) | (0.00000) | (0.00000) | (1.30E-6) |
| Income^2 | -3.77e-10** | -2.63e-10** | -1.32e-10** | -4.35e-11* |
| | (1.72e-11) | (1.97e-11) | ( 1.82e-11) | (2.60e-11) |
| Income^3 | 1.32e-15** | 8.70e-16** | 3.33e-16** | 2.92e-16* |
| | (1.06e-16) | (1.22e-16) | (1.10e-16) | (1.62e-16) |
| Income^4 | -1.51e-21** | -9.94e-22** | -2.54e-22 | -5.79e-22** |
| | (1.86e-22) | (2.12e-22) | (1.89e-22) | (2.87e-22) |
| Age | 0.016** | 0.018** | 0.022** | 0.033** |
| | (0.0016) | (0.0018) | (0.0020) | (0.0024) |
| Age^2 | -0.00004** | -0.097** | -0.00061 | 0.089** |
| | (0.00002) | (0.010) | (0.011) | (0.014) |
| Male | -0.120** | -0.00004** | -0.00022** | -0.00016** |
| | (0.0089) | (0.00002) | (0.00002) | (0.00002) |
| Married | 0.523** | 0.412** | 0.331** | 0.254** |
| | (0.0097) | (0.011) | (0.012) | (0.015) |
| Number of Kids | -0.025** | 0.00067 | 0.017** | -0.077** |
| | (0.0048) | (0.0055) | (0.0056) | (0.0073) |
| Total Expenditure | 0.00001** | 0.00001** | 0.00001** | 0.00000** |
| | (0.00000) | (0.00000) | (0.00000) | (0.00000) |
| Constant | 5.49** | 4.86** | 4.81** | 3.75** |
| | (0.053) | (0.061) | (0.063) | (0.080) |
| R-squared | 0.395 | 0.254 | 0.266 | 0.095 |

Source: FAMEX and SHS 1986-2000. Standard errors in parentheses. All specifications include year and province dummies. The dependent variables are in logs. ** denotes significance at the 5% level and * denotes significance at the 10% level.

Table 5: IV Full Sample Using Change in Tax Price Between *t* and *t-1* as an Instrument

| | All health care expenditures | Direct Costs to Households | Health Insurance Premiumns | Prescription Drugs |
|---|---|---|---|---|
| Tax Price | -0.662** | -0.701** | 0.421** | -0.515** |
| | (0.117) | (0.124) | (0.147) | (0.150) |
| Income | 0.00002** | 0.00001** | 0.00001** | -0.00001** |
| | (0.00000) | (0.00000) | (0.00000) | (0.00000) |
| Income^2 | -3.89e-10** | -2.29e-10** | -1.94e-10** | 4.27e-11* |
| | (1.89e-11) | (2.01e-11) | (2.19e-11) | (2.61e-11) |
| Income^3 | 1.73e-15** | 1.02e-15** | 9.10e-16** | 6.99e-17 |
| | (1.15e-16) | (1.22e-16) | (1.29e-16) | (1.61e-16) |
| Income^4 | -2.41e-21** | -1.47e-21** | -1.30e-21** | -4.13e-22 |
| | (2.00e-22) | (2.12e-22) | (2.16e-22) | (2.82e-22) |
| Age | 0.019** | 0.016** | 0.032** | 0.025** |
| | (0.0016) | (0.0017) | (0.0020) | (0.0021) |
| Age^2 | -0.00002 | 0.00003** | -0.00028** | -0.00004* |
| | (0.00002) | (0.00002) | (0.00002) | (0.00002) |
| Male | -0.167** | -0.161** | -0.013 | 0.057** |
| | (0.0082) | (0.0088) | (0.0099) | (0.011) |
| Married | 0.492** | 0.435** | 0.303** | 0.259** |
| | (0.0089) | (0.0095) | (0.011) | (0.013) |
| Number of Kids | 0.024** | 0.052** | 0.034** | -0.031** |
| | (0.0043) | (0.0045) | (0.0051) | (0.0058) |
| Total Expenditure | 0.00001** | 0.00001** | 0.00001** | 0.00000** |
| | (0.00000) | (0.00000) | (0.00000) | (0.00000) |
| Constant | 4.60** | 4.41** | 3.90** | 4.03** |
| | (0.126) | (0.134) | (0.153) | (0.160) |
| R-squared | 0.291 | 0.222 | 0.161 | 0.129 |

Source: FAMEX and SHS 1986-2000. Standard errors in parentheses. All specifications include year and province dummies. The dependent variables are in logs. ** denotes significance at the 5% level and * denotes significance at the 10% level. The first stage t-statistic for the excluded instrument is 67.9. See text for construction of the instrument.

Table 6: IV Full Sample using First Dollar Tax Price as an Instrument

| | All health care expenditures | Direct Costs to Households | Health Insurance Premiumns | Prescription Drugs |
|---|---|---|---|---|
| Tax Price | -1.09** | -0.804** | -0.105* | -0.303** |
| | (0.055) | (0.059) | (0.057) | (0.068) |
| Income | 0.00002** | 0.00001** | 0.00001** | -0.00001** |
| | (0.00000) | (0.00000) | (0.00000) | (0.00000) |
| Income^2 | -3.48e-10** | -2.19e-10** | -1.43e-10** | 2.11e-11 |
| | (1.59e-11) | (1.71e-11) | (1.73e-11) | (2.23e-11) |
| Income^3 | 1.50e-15** | 9.62e-16** | 6.34e-16** | 1.91e-16 |
| | (9.93e-17) | (1.07e-16) | (1.05e-16) | (1.42e-16) |
| Income^4 | -2.05e-21** | -1.38e-21** | -8.71e-22** | -6.04e-22** |
| | (1.77e-22) | (1.91e-22) | (1.82e-22) | (2.55e-22) |
| Age | 0.018** | 0.016** | 0.030** | 0.026** |
| | (0.0015) | (0.0016) | (0.0018) | (0.0021) |
| Age^2 | 0.00000 | 0.00004** | -0.00025** | -0.00005** |
| | (0.00001) | (0.00002) | (0.00002) | (0.00002) |
| Male | -0.164** | -0.160** | -0.010 | 0.057** |
| | (0.0081) | (0.0087) | (0.0097) | (0.011) |
| Married | 0.491** | 0.435** | 0.305** | 0.258** |
| | (0.0088) | (0.0095) | (0.011) | (0.013) |
| Number of Kids | 0.024** | 0.052** | 0.033** | -0.031** |
| | (0.0042) | (0.0045) | (0.0050) | (0.0058) |
| Total Expenditure | 0.00001** | 0.00001** | 0.00001** | 0.00000** |
| | (0.00000) | (0.00000) | (0.00000) | (0.00000) |
| Constant | 5.04** | 4.51** | 4.42** | 3.81** |
| | (0.069) | (0.074) | (0.075) | (0.088) |
| R-squared | 0.315 | 0.226 | 0.197 | 0.124 |

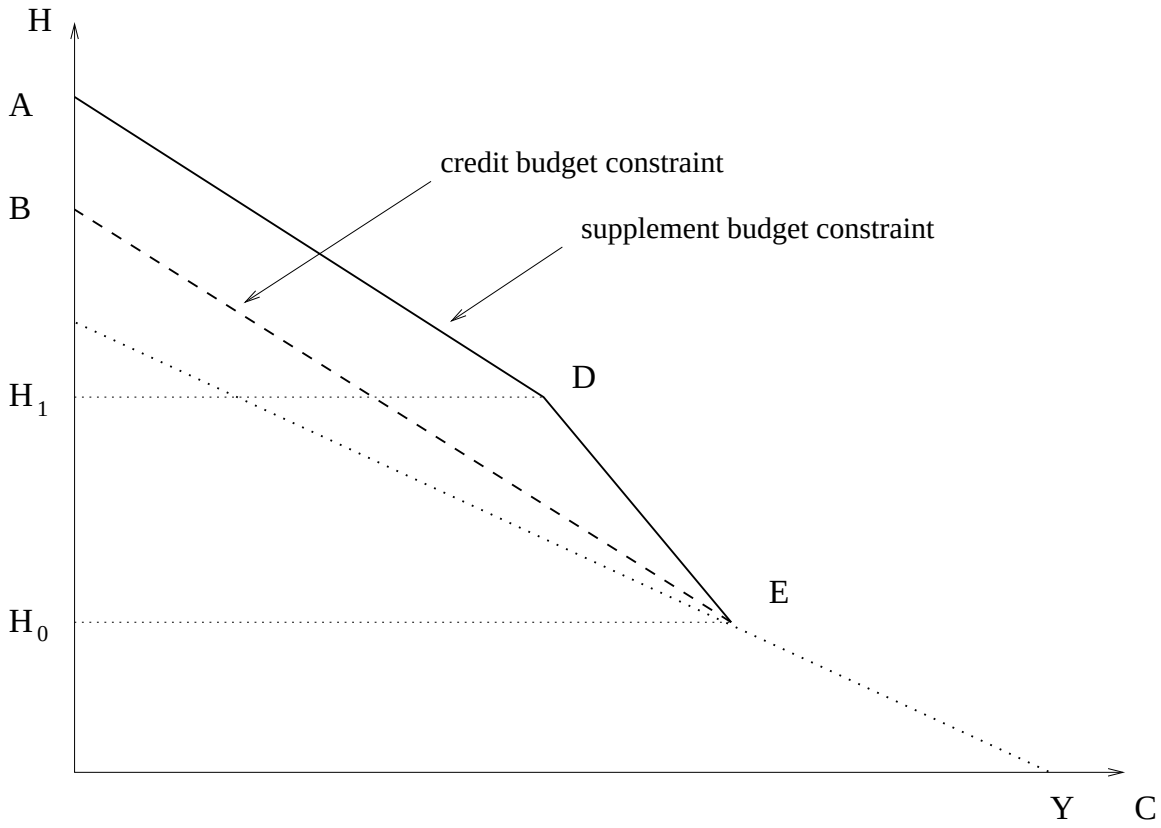
Source: FAMEX and SHS 1986-2000. Standard errors in parentheses. All specifications include year and province dummies. The dependent variables are in logs. ** denotes significance at the 5% level and * denotes significance at the 10% level. The first stage t-statistic for the excluded instrument is 157.4. See text for construction of the instrument.

Table 7: IV Full Sample using both Change in Tax Price and First Dollar Tax Price as Instruments

| | All health care expenditures | Direct Costs to Households | Health Insurance Premiumns | Prescription Drugs |
|---|---|---|---|---|
| Tax Price | -1.03** | -0.790** | -0.061 | -0.327** |
| | (0.053) | (0.057) | (0.056) | (0.066) |
| Income | 0.00002** | 0.00001** | 0.00001** | -0.00001** |
| | (0.00000) | (0.00000) | (0.00000) | (0.00000) |
| Income^2 | -3.54e-10** | -2.20e-10** | -1.48e-10** | 2.34e-11 |
| | (1.58e-11) | (1.70e-11) | (1.73e-11) | (2.23e-11) |
| Income^3 | 1.53e-15** | 9.70e-16** | 6.57e-16** | 1.78e-16 |
| | (9.91e-17) | (1.07e-16) | (1.05e-16) | (1.41e-16) |
| Income^4 | -2.10e-21** | -1.39e-21** | -9.06e-22** | -5.83e-22** |
| | (1.77e-22) | (1.91e-22) | (1.82e-22) | (2.55e-22) |
| Age | 0.018** | 0.016** | 0.030** | 0.026** |
| | (0.0015) | (0.0016) | (0.0018) | (0.0021) |
| Age^2 | -0.00000 | 0.00004** | -0.00025** | -0.00005** |
| | (0.00001) | (0.00002) | (0.00002) | (0.00002) |
| Male | -0.164** | -0.160** | -0.010 | 0.057** |
| | (0.0081) | (0.0087) | (0.0097) | (0.011) |
| Married | 0.491** | 0.435** | 0.304** | 0.258** |
| | (0.0088) | (0.0095) | (0.011) | (0.013) |
| Number of Kids | 0.024** | 0.052** | 0.033** | -0.031** |
| | (0.0042) | (0.0045) | (0.0050) | (0.0058) |
| Total Expenditure | 0.00001** | 0.00001** | 0.00001** | 0.00000** |
| | (0.00000) | (0.00000) | (0.00000) | (0.00000) |
| Constant | 4.98** | 4.50** | 4.37** | 3.84** |
| | (0.067) | (0.072) | (0.074) | (0.087) |
| R-squared | 0.312 | 0.226 | 0.194 | 0.124 |

Source: FAMEX and SHS 1986-2000. Standard errors in parentheses. All specifications include year and province dummies. The dependent variables are in logs. ** denotes significance at the 5% level and * denotes significance at the 10% level. The first stage F-statistics for the excluded instruments is 13,788. See text for construction of the instrument.

Figure 1:




The figure depicts a notional budget constraint for 2 goods: C, a taxable consumption good, and H, health care spending.