The US Individual Income Tax and the Medical Expense Deduction[+]

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Abstract

The US federal individual income tax allows households that forgo the standard deduction for itemized deductions to deduct qualified medical expenses above a floor (linked to their adjusted gross income). In this paper, we examine large cross sections of federal tax returns from the 1980s to study the responsiveness of medical deductions with respect to taxpayers' income, the tax price, and the floor. The 1980s are well suited to conduct this inquiry. Tax reforms changed marginal tax rates and income floors several times, and thus provide suitable "experiments."

Our empirical strategy uses standard instrument choices to identify statistically the tax price effects. We also take an additional methodological step by explicitly endogenizing the taxpayer's decision to itemize and correcting the results for selectivity.

We estimate an income elasticity for medical deductions close to 0.4, a tax price elasticity near –1.1 and an income floor elasticity of –2.3 after applying Heckman's econometric methodology that accounts for selectivity. Given the residual nature of deductions these elasticities cannot be compared directly to the usual elasticity estimates. However, they are roughly consistent with a 0.62 income elasticity and a –0.65 price elasticity for the underlying demand for health care.

1. Introduction

Some features of the US tax system are widely believed to influence health expenditures and health care provision patterns.[1] Several of these features have been studied extensively. The tax deductibility of employer provided health insurance for the purposes of corporate, personal and payroll taxes have been examined in the literature surveyed by Gruber (2001). Other studies have dealt with the personal income tax deductions for the purchase of health insurance by the self-employed (Gruber and Poterba (1994)). Additional provisions of the tax code that affect health care that have been analyzed include cafeteria plans and medical savings accounts.

Since 1942 the US individual income tax has allowed taxpayers who itemize their deductions to use their un-reimbursed health expenditures above a given percentage of Adjusted Gross Income (AGI) as a deduction against gross income in arriving at taxable income. However, this continuing feature of the US individual income tax system that affects health expenditures seems to have been neglected by economists.

These features of the US tax system turn it into a catastrophic health insurance plan since they reduce taxpayer's taxes when the health costs sustained by the taxpayer are relatively large. However, there is a unique characteristic of this scheme that differs from typical insurance: the deductible level is income related, something that we rarely observe in the usual health insurance schemes. This may turn out to be useful for policy purposes.

In ageing democracies, there are constant pressures to change the tax treatment of health care. The Health Savings Account included in the legislation approved in 2003 is just the latest of a series of changes that started with the Tax Reform Act of 1986. Both for government and for health industry institutions, it is useful to have a better idea about the implications of changing the tax law with respect to behavior, consumption of health care and the tax revenue impact.

[1] See Section 13 of the *Green Book* (2004), Committee on Ways and Means of the US House of Representatives, for a list of health related tax provisions and their significance.

Two examples illustrate this reasoning. The first is the current trend of adopting schemes that limit moral hazard by consumers, and lead to instruments such as health savings accounts, and more generally towards consumer-directed health care plans. These instruments need to be complemented by catastrophic health insurance if they are to be appealing. The personal income tax features already described fit nicely in this picture, and it would not be surprising if legislators decided to change the tax system to increase its role as a supplemental catastrophic health insurance. Health savings accounts should have no significant demand side moral hazard problems for low expenditures, but what happens when these are higher and over the deductible?

Second, some view the tax system as the appropriate vehicle to address health coverage and access, and suggest using the tax system through income tax credits and selective lower AGI limits either as health policy instruments to decrease the number of people uninsured or as a tool to provide relief for the medical expenses of uninsured households. This raises obvious research and public policy questions. What are the effects of lowering the deductible/AGI limit on health care consumption? What are the effects of using tax credits (at arbitrary rates) rather than deductions to income? In this paper we begin to address these questions by conducting an econometric analysis of historical tax return information from the 1980's.

In particular we address below operational questions regarding the sensitivity of health deductions with respect to income tax parameters and personal characteristics: How do observed health deductions change with their tax price, i.e. the net price when tax deductibility is taken into account? How do the AGI limits affect health deductions? How do these tax parameters affect health expenditures?

These questions are interesting for two reasons. First, the tax data used provide us with an opportunity to estimate statistically price, income and deduction elasticities for health expenditures and for tax deductions from a system that by definition has no health related self-selection in its participants. The second is that the knowledge of how households adapt their behavior to changes in these policy parameters may turn out to be useful if tax

policy is used further as an auxiliary tool to address health policy problems. In particular, we can get answers to the one question that never fails to come up with tax policy: How much does each measure cost the government?

2. Health expenditures and federal medical expense deduction rules

Taxpayers who chose to forgo the standard deduction and itemize their deductions can deduct own health insurance costs and un-reimbursed medical expenses if they corresponded to deductible health care expenditures (inpatient care, doctor visits, procedures, treatments, diagnostics, prescription drugs and insulin, etc) and associated travel and lodging expenses allowed under Section 213 of the Internal Revenue Code.[2] Only the amounts over a given percentage of Adjusted Gross Income (AGI) have been deductible. The exception to this rule was that until 1982 taxpayers could deduct half of their health insurance up to $150. From 1954 through 1982, the floor for the medical expense deduction was 3 percent of AGI. The Equity and Fiscal Responsibility Act of 1982 changed the floor to 5 percent, and finally the Tax Reform Act of 1986 set the floor at 7.5 percent.

Until 1983 prescription drugs had special tax treatment, because only the expenses on prescription drugs over one percent of AGI could be added to the other medical expenses to generate the deduction. Table 1 provides a synthesis of the main rules about medical deductions of the federal individual income tax in the 1980's.[3]

[2] The deduction includes both direct health care costs and health insurance costs so it does not change the relative price of insured versus uninsured health care. However, since the deduction works as an insurance mechanism it may change the demand for other types of health insurance.

[3] Pechman (1987) summarizes historical information on the federal individual income tax.

TABLE 1.

Medical Expense Deductions and the Federal Individual Income Tax: Basic Features and Changes in the 1980's

Year	AGI Floor %	Marginal Tax Rates	Other Rules	Deduction Amount
1980	3.0	14 up to 70%	Separate prescription drugs (over 1% AGI),	Max (Exp-3%AGI,0)+min(½ HI, 150)
1981	3.0	13.825 up to 69.125%	Separate prescription drugs (over 1% AGI),	Max (Exp-3%AGI,0)+min(½ HI, 150)
1982	3.0	12 to 50%	Separate prescription drugs. (over 1% AGI),	Max (Exp-3%AGI, min(½ HI, 150))
1983	5.0	11 up to 50%	Separate prescription drugs (over 1% AGI),	Max (Exp-5%AGI,0)
1984	5.0	11 to 50%	All added.	Max (Exp-5%AGI,0)
1985	5.0	11 to 50%	All added	Max (Exp-5%AGI,0)
1986	5.0	11 to 50%	All added	Max (Exp-5%AGI,0)
1987	7.5	11 up to 38.5%	All added	Max (Exp-7.5%AGI,0)
1988	7.5	15 up to 35%	All added	Max (Exp-7.5%AGI,0)
1989	7.5	15 up to 35%	All added	Max (Exp-7.5%AGI,0)

Notes: Exp:medical expenses; AGI: Adjusted Gross Income; HI: Health Insurance deduction.

One convenient feature of the rules on medical deductions that simplifies our analysis is that they are not affected by Alternative Minimum Tax limitations on itemized deductions applicable to taxpayers with high AGIs.

3. Data and Econometric Methodology

3.1 Data Sources

Our analysis is carried out using individual income tax returns routinely made available in anonymous, public use samples by the Statistics of Income Division of the Internal Revenue Service. We consider data from 1980 up to 1989. These are annual cross sections of individual returns. The samples are large (about 100,000 returns/year on average), and they were generated by IRS by stratified sampling so as to be representative of the entire US income tax return population[4]. They have been used in many studies: Feenberg and Couts (1993) provide some historical information on uses of

[4] All statistical procedures used weight the data in order to conform to its stratified sampling nature.

this data. Gouveia and Strauss (1994) present descriptive and graphical information on some features of the annual cross sections used in this paper.

Our unit of analysis is the federal individual tax return. Our empirical definition of economic income includes all sources identifiable from the tax returns: labor income, interest, dividends, capital gains, rents, royalties, pensions, sole proprietorships income, and farm income. All sources of income, in particular capital gains, were "grossed up before exclusions" whenever applicable. Only sources of income not available in federal tax returns were left out. The result is the most comprehensive measure of income that is possible in the SOI data without performing any imputations.

Our data has both advantages and disadvantages relative to the expenditure surveys and population surveys used in Gruber and Poterba (1994) or household expenditure surveys in Smart and Stabile (2003). The disadvantage is that we only have a good measure of the medical expense deductions, and do not know total expenses or even the total consumption for those taxpayers who do not claim medical deductions. On the other hand, our tax data does not require imputations and strong assumptions to calculate tax prices and deduction amounts as they are directly measured. This is even more important when we consider that the instruments we will be using in the econometric specifications are marginal tax rates calculated at counter-factual levels of taxable income (corresponding generally to the first dollar of deductions) that are easily and precisely calculated with the information in the tax returns.

3.2 General Data Description

For each year of data the analysis uses only returns from that year (no amended returns) and with an Economic Income above a threshold indexed by the CPI to $2,500 in 1980. This eliminates observations with negative incomes and others where the levels of income reported may be more the result of aggressive tax avoidance than meaningful measures of the taxpayer's purchasing power. [5]

[5] This threshold is below the $4400 official poverty line for single individuals in 1980.

The correlation between our income variable, Economic Income, and the tax variable, Adjusted Gross Income (AGI), is far from perfect. For our 1980-1989 cross sections, with a total near 990,000 observations, the correlation coefficient between AGI and Economic Income is 0.865.

The correlation between Economic Income and AGI is important because one of the important parameters we want to estimate is the elasticity of medical deductions with respect to the AGI floor. This is, in fact, an elasticity of the "tax insurance claims" with respect to the level of the deductible. If AGI floors and Economic Income were perfectly correlated, it would have been impossible to identify separately the effects of income and the effects of the deductible on medical deductions. However, we already know that the correlation between AGI and economic income is far from perfect. Additionally, one of the advantages of using data from the 80's is that this period saw tax reforms that substantially changed tax rates and the AGI percentages used as floors for the medical deductions, as Table 1 shows. The result is that for our repeated cross sections the correlation between economic income and the AGI floor is lower than for AGI proper: it is 0.822 for the period 1980-1989.

3.2 Patterns of Medical Expense Deductions

We now look in more detail at medical expense deductions. This measure of health spending includes all allowable health care expenditures over AGI limits that vary across the years in our sample, from 3% to 7.5%. Table 2 provides aggregate data for the frequency of the use of medical expense deductions.

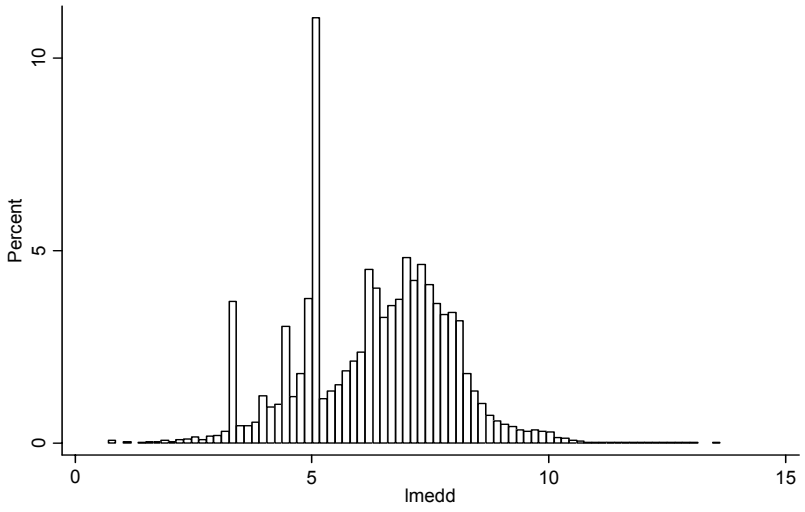
TABLE 2.
Frequency and Amounts of Medical Deductions

Year	% Returns Itemized	Returns with Medical Deductions as % all Returns	Returns with Medical Deductions as % all itemized returns	Medical Deductions as % of all itemized deductions
1980	48.58	25.06	51.58	3.92
1981	33.17	22.20	66.91	6.97
1982	35.26	23.18	65.75	7.57
1983	36.74	9.95	27.08	5.81
1984	38.51	10.74	27.9	5.99
1985	39.20	10.60	27.05	5.66
1986	39.47	10.23	25.92	5.62
1987	33.30	5.01	15.03	4.38
1988	29.08	4.38	15.08	4.55
1989	28.49	4.57	16.05	4.87

Source: SOI 1980-1989 and authors' calculations.

Figure 1 illustrates the distribution of the natural log of positive medical deductions, and Table 3 provides some descriptive statistics. [6]

FIGURE 1
Histogram of the log of positive medical deductions



[6] The largest spike in the histogram corresponds to the deduction of half of health insurance up to $150. This deduction was not subject to the AGI limit up to 1982.

TABLE 3
Descriptive Statistics for Medical Deductions

Overall Sample

Variable	Obs.	Population represented	Mean	Std. Dev	Min	Max
ecinc	984309	877805641	28363.63	110967.8	2502	4.71e+08
agilim	969873	876379793	1450.733	6041.457	.03	3.53e+07
txrt	984309	877805641	19.88379	9.882896	0	70
medd	984309	877805641	214.0364	1484.829	0	702800

Itemizers

Variable	Obs.	Population represented	Mean	Std. Dev	Min	Max
ecinc	678225	348373055	46114.48	171016	2712	4.71e+08
agilim	678225	348373055	2330.606	9418.661	.03	3.53e+07
txrt	678225	348373055	25.03509	10.01084	0	70
medd	678225	348373055	539.3138	2319.454	0	702800

Positive Medical Deductions

Variable	Obs.	Population represented	Mean	Std. Dev	Min	Max
ecinc	170838	116858861	32488.9	54153.92	2712	2.34e+08
agilim	170838	116858861	1232.274	1303.81	.05	2840999
txrt	170838	116858861	23.013	11.22346	0	70
medd	170838	116858861	1607.772	3784.228	1	702800

3.4 Statistical Specification and Estimation Issues

The variable we want to explain is the medical expense deduction claimed on federal individual tax returns. The explanatory variables of immediate interest are the economic income of the taxpayer, the AGI floor for medical deductions (the equivalent of an insurance policy deductible), and the tax price. Given the deductibility of medical expenses, the marginal dollar spent on health care has a net, after-tax cost of 1-t, where t is the taxpayer's marginal individual income tax rate.

Several other control variables are used in the regressions:

- A first set of controls uses data on exemptions (exemption for primary taxpayer, exemption for secondary exemptions for children at home, exemptions for children away from home, exemptions for dependent parents, and exemptions for

other dependents); it also includes dummies for aged (and or blind[7]) primary and secondary taxpayers. The omitted categories are non-blind and non-aged primary taxpayer and non-existent secondary taxpayer.

- A second set of controls includes dummy variables for marital status (single, married filing jointly, married filing separately, head of household). These variables take into account differences in household situations as well as differences in their tax treatments. The omitted category is single.
- Year dummies compose a third set of controls. The year dummies control for changes in price levels, in business cycle conditions and in tax rules other than those reflected in tax rates and AGI limits. The omitted year in 1980.
- State dummies are the last control set.

The exemptions and marital status variables are the best sources of demographic information available in the SOI datasets, and should be able to control for most demographic effects. All regressions are performed using natural logs, with the logs computed as ln(X+$1.00) where X is the medical expense deduction amount.

The regression equation that we estimate has the following form:

$$\ln(\text{Medical Expense Deduction})_{it} = \beta_0 + \beta_1 \ln(\text{Tax Price})_{it} + \beta_2 \ln(\text{Income})_{it} + \beta_3 \ln(\text{AGI floor})_{it} + \alpha X_{it} + \gamma \text{ State Dummy}_i + \delta \text{Year Dummy}_t + \varepsilon_{it} \quad (1)$$

Since medical expense deductions, tax prices, incomes and floors all enter in logs, the coefficients of (1) are directly the elasticities of deductions with respect to the tax price, income and the floor. Economic theory leads us to expect that $\beta_1 < 0$, β_2 and $\beta_3 > 0$. As we shall see, without a great deal of care in the econometric estimation of these parameters, tax return data on health expenditures will not reveal such plausible results.

[7] When we look at the 1980-1989 data below, we find that the data for 1988 and 1989 do not allow us to separate blind from age exemptions.

The variables in vector X include several types of exemptions as well as the dummies for marital status, for age, and for blindness. As a starting point, Equation (1) will be estimated by OLS. The specification problems raised by OLS will first be addressed by using instrumental variables (IV) so as to deal with the endogeneity of the tax price. Finally, we will also deal with selectivity based problems generated by the decision to itemize by using the two step procedure in Heckman (1979).

4. Econometric Results

Table 5 reports the main OLS results. They reveal problems, as the results are not compatible with expectations based on economic theory. The coefficient of the log of tax price, β_1, is positive, as is β_3 , the coefficient on the AGI floor. These results are understandable once we realize that estimation by OLS involves a misspecification of the model, as the marginal tax rate is endogenous to the behavior of the taxpayer. This is a general problem with tax return data we have been aware at least since Feldstein (1975).

TABLE 5
OLS Regression Explaining Medical Expense Deductions, 1980-1989

Regression with robust standard errors

Number of obs	= 943560
F(80,943479)	= 787.63
Prob > F	= 0.0000
R-squared	= 0.1197
Root MSE	= 2.0704

Explanatory Variable	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
ltxprice	4.183276	.0614497	68.08	0.000	4.062837	4.303716
lecinc	.8535632	.0211001	40.45	0.000	.8122077	.8949187
lagilim	.1232304	.0205421	6.00	0.000	.0829685	.1634922

Note: ltxprice=ln(1-t), where t is the marginal tax rate, lecinc is the natural log of Economic Income and lagilim is the natural log of the AGI floor. Regression results include controls for different types of exemptions, dummies for marital status, dummies for years and dummies for states that are available from the authors upon request.

Since Feldstein's contribution, the way to deal with this problem is to use instrumental variables estimation and to use as instrument the tax price obtained for the first dollar of

the deduction.[8] The methodology we followed is to construct a tax calculator that finds the tax bracket and the marginal tax rate where the taxpayer would be if he had zero deductions for every year in our data and for every type of return. We then use that tax rate to construct our instrument: the corresponding log of the tax price.

Table 6 shows the results from this instrumental variables regression.[9] As it turns out the coefficient of the log of the tax price is still positive. We interpret this as saying that the model is still misspecified. This is not a complete surprise since Feenberg (1987) shows that even the first dollar deduction marginal tax rate instrument may not be enough to identify the tax price effect.

TABLE 6
IV Regressions for Medical Expense Deductions, 1980-1989

Instrument uses calculated marginal tax rate at Zero Medical Expense Deductions

```
Regression with robust standard errors                Number of obs =  943560
                                                      F( 80,943479) =  767.15
                                                      Prob > F      =  0.0000
                                                      R-squared     =  0.1068
                                                      Root MSE      =  2.0854
------------------------------------------------------------------------------
Explanatory  |               Robust
  Variable   |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  p2ltxprice |   .4122875   .0569481     7.24   0.000     .3006712    .5239038
      lecinc |   .6766328    .021808    31.03   0.000     .6338899    .7193756
     lagilim |  -.2746152   .0217135   -12.65   0.000     -.317173   -.2320574
```

Note: p2ltaxprice is the instrumented of the tax price. See Table 5 for the additional control variables used in the regression.

One assumption underlying the solutions attempted is that the marginal tax rate of the first dollar of medical deductions will be a good instrument because it will not be a

[8] Triest (1998) presents a survey of these methodological issues.
[9] In our IV regressions the first stage regresses the log of the tax price on the instrument and on all the other variables in equation (1). The p-values for the instrument in these regressions are under 0.001.

function of the behavior under study. But the behavior we have to deal with is not just the deduction of all medical expenditures. That is, it is plausible that these and other deductions are jointly determined. Burman and Randolph (1995) faced a similar problem in studying capital gains realizations. They found that income sources other than capital gains also needed to be set to zero in order to find a well-specified instrument for marginal tax rates. In our case this means we should try to use as an instrument the marginal tax rate that would hold for zero medical *and* other deductions. Which other deductions? We may want to be comprehensive in our analysis and accept that the relevant pattern of behavior that we are studying includes at its core the choice to itemize or not. An example of this idea is Triest (1992) which shows that itemization is important to model taxpayers' labor supply behavior.

Only after becoming an itemizer can a taxpayer deduct medical expenditures. By focusing on the choice to itemize, we find that there is a natural instrument that we can use: the marginal tax rate at zero excess itemized deductions. This is the marginal tax rate that a taxpayer would face if he claimed the standard deduction, everything else being the same. We can then use the tax calculators developed earlier to compute for all observations the marginal tax rate at the taxable income levels that would prevail if all taxpayers claimed only standard deductions. Table 7 shows the results for the regressions using such an instrument.

The results in Table 7 which accounts for selective reveal the expected negative tax price elasticity, a positive income elasticity of 0.56 and a negative elasticity with respect to the AGI floor of –0.54. The price elasticity is surprisingly large.

TABLE 7
IV Regressions for Medical Expense Deductions, 1980-1989

Instrument uses calculated marginal tax rates at standard deductions

```
Regression with robust standard errors                Number of obs =  943560
                                                      F( 80,943479) =  796.29
                                                      Prob > F      =  0.0000
                                                      R-squared     =  0.1088
                                                      Root MSE      =  2.0832
------------------------------------------------------------------------------
 Explanatory |               Robust
  Variable   |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  p4ltxprice |  -2.142355   .0649306   -32.99   0.000    -2.269617   -2.015093
      lecinc |   .5567719   .0225949    24.64   0.000     .5124867    .6010571
    lagilim  |  -.5441343   .0229626   -23.70   0.000    -.5891402   -.4991283

Note: p4ltaxprice is the instrumented tax price log. See Table 5 for the
additional control variables used in the regression.
```

The tax price elasticity, while of the theoretically expected sign, is implausibly large and suggests a deeper problem. Once we understand that the decision to itemize is crucial to estimate the price, income and floor elasticities, then the question arises as to what extent are these elasticities estimates due to the effects of the tax parameters on the medical expenditures or due to the effects on the decision to itemize itself? So far we have used the SOI data as reported on tax returns. This means non-itemizers get assigned a zero medical deduction since they did not file an itemized deduction schedule with their basic 1040. However, there is a qualitative difference between a zero deduction by an itemizer for whom that is a choice and a zero deduction for a non-itemizer. In this second case, conditioning on being a non-itemizer, there is no choice and thus we can think of the deduction more as missing data.

To deal with this problem in our empirical strategy we resort to Heckman's two-step model for selectivity (Heckman (1979)). In our case the first step models whether a taxpayers itemizes or not, and the second step models the level of medical expense deductions, given that the taxpayer has become an itemizer.

We begin by explicitly modeling the decision to itemize by estimating a probit equation. We take the decision to itemize to be a function of the variables considered in the previous regressions and also of additional variables proxying for other characteristics of the tax return such as complexity and sophistication. To capture these other relevant characteristics, we concentrate on income sources, and include the *share* of interest income, dividends, capital gains, schedule C income (sole proprietorships and partnerships) on total income as well as the ratio of self-employment taxes to total income. The main results of the estimated probit equations are reported in Appendix, Table A.1.

The probit results show that higher incomes and higher tax rates at standard deduction levels lead to a greater propensity to itemize. The same holds for the shares of income in the form of dividends and interest and for higher self-employment taxes whereas the reported incomes from Schedule C and capital gains seem to have a negative effect.

From the probit we generate the inverse Mills ratios (λ's), and then run the second stage regression explaining the levels of the log of medical expense deductions by the log of income, the log of the AGI floor and the instrumented log of the tax price. The results are in Table 8, and now are markedly different from the earlier OLS and IV estimates. Note first that the inverse Mills ratio is statistically significant which demonstrates that it is important to correct for selectivity. We also see in Table 8 negative elasticities for the tax price and for the AGI floor.

TABLE 8
Heckman Second Stage Regression for Medical Expense Deductions, 1980-1989

Instrument use calculated marginal tax rate at standard deductions

```
Regression with robust standard errors                Number of obs =  645877
                                                      F( 81,645795) = 1185.18
                                                      Prob > F      =  0.0000
                                                      R-squared     =  0.2639
                                                      Root MSE      =  2.6418
------------------------------------------------------------------------------
 Explanatory |               Robust
   Variables |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      lecinc |   .3690781   .0592038     6.23   0.000     .2530405    .4851157
     lagilim |  -2.262161   .0731611   -30.92   0.000    -2.405554   -2.118767
  p4ltxprice |  -1.132753   .1494257    -7.58   0.000    -1.425622   -.8398832
      λ      |  -.4383844   .0445117    -9.85   0.000    -.5256258    -.351143
```

The income elasticity is 0.37 and the tax price elasticity is significantly negative with a large point estimate of –1.13 and a 95% robust confidence interval including –1. Compared to the earlier IV results, we find the AGI floor now has a large negative elasticity of –2.26. Table 9 contains a comparison of the main econometric results for medical expense deductions.

TABLE 9
Comparative Table for Medical Expenses Regressions

	OLS	IV	IV	Heckman-2nd step
Instrument	-	LTXPR at Zero Medical Deductions	LTXPR at Standard Deduction	LTXPR at Standard Deduction
log taxprice	**4.183276**	**.4122875**	**-2.142355**	**-1.132753**
st err	.0614497	.0569481	.0649306	.1494257
	p<0.001	p<0.001	p<0.001	p< 0.001
log income	**.8535632**	**.6766328**	**.5567719**	**.3690781**
st err	.0211001	.021808	.0225949	.0592038
	p<0.001	p<0.001	p<0.001	p=0.050
log AGI floor	**.1232304**	**-.2746152**	**-.5441343**	**-2.262161**
st err	.0205421	.0217135	.0229626	.0731611
	p<0.001	p<0.001	p=0.103	p<0.001
λ	-	-	-	**-.4383844**
st err	-	-	-	.0445117
	-	-	-	p<0.001
N	**943560**	**943560**	**943560**	**645877**
R-Squared	**0.1197**	**0.1068**	**0.1088**	**0.2639**

Note: See Table 5 for additional control variables used in the regressions. .LTXPR – log of tax price with marginal tax rate set at the level indicated for taxable income.

5. Discussion

The results for overall medical deductions were obtained using data from 1980 up to 1989. The estimated income elasticity was 0.37, the tax price elasticity was –1.1 and the elasticity with respect to the AGI limit was –2.26.

To put our results in perspective, one must not compare directly the above deduction elasticities with the elasticities for health care consumption that one can find in the literature, i.e. Newhouse (1993). Deductions have a residual nature due to the AGI floors. For the typical case of positive health care deductions, we may write:

$$D(y,p) = Q(y,p) - F(y)$$

where D is the deduction amount, Q is the overall health care expenditure amount, F is the deduction limit as a function of income y, and p is the tax price. To get from the tax price elasticity of deductions to the tax price elasticity of overall medical consumption, we need to multiply the tax price deduction elasticities by the ratio D/Q. For example, if only half of the total health care consumption is deductible then the tax price consumption elasticities are half of the estimates for the tax price deduction elasticities. In our data, for those taxpayers with positive medical deductions these are roughly 57% of medical expenses[10], so our estimates are compatible with a health care demand price elasticity of –0.65.

For income elasticities the relationship is slightly different. When deductions are positive, we have:

$$\eta^Q = \eta^D (D/Q) + \eta^F (F/Q),$$

where η^Q , η^F η^D are the income elasticities of medical consumption, deduction limits and deductions, respectively. If $\eta^F = 0.96$[11] and, D/Q=.57, then our 0.37 income deduction elasticity is compatible with a 0.62 medical consumption income elasticity.

These results are important in at least two dimensions. The first is that they show a meaningful responsiveness of taxpayers to the incentives they are given by tax rules. This is not a trivial finding. As Smart and Stabile (2003) point out, it is reasonable to suspect that delayed and uncertain incentives may not have significant effects, particularly in an area such as health care where consumption may not be fully under the control of the patient / taxpayer. Contrary to most insurance mechanisms, only at the end of the year does the taxpayer see the amounts "reimbursed" by the income tax. If enough taxpayers were heavily myopic, liquidity constrained, or just perfectly passive consumers of medical care one could reasonably expect that there would be no effects of medical

[10] We approximate total expenditures by adding medical deductions to the AGI limits. This proportion changes from year to year and increases over time in our sample.
[11] This is the average estimate across the years in the sample.

deduction tax parameters on the deduction amounts. Our results clearly show that is not the case as taxpayers respond to incentives in a quantitatively significant way.

The second dimension in which we believe our results are important relates to current discussions about health care policy. The US personal income tax works as a catastrophic health insurance program as it only begins to play a role when medical expenditures become quite large. This means that our results are relevant for the understanding of policies that promote the expansion of consumer driven health systems with the use of self-insurance for lower expenditures (using vehicles such as Health Savings Accounts). Typically, such schemes include some type of catastrophic health insurance to protect households against extreme situations. One might expect that, overall, these programs would have little moral hazard problems because of self-insurance for low expenditures and because very high expenditures might typically correspond to situations with little room for taxpayer control. Again, our results show that is not the case, since we find that taxpayers display price and income sensitivity *above* AGI floors that have been enacted and changed.

We interpret our findings as saying that even catastrophic health insurance may generate substantial moral hazard. Considering that household medical expenditures are extremely skewed, and that a sizeable portion of total expenditures are made by a small percentage of people, we find that a large fraction of total health expenditures would be subject to moral hazard even if the entire population was covered by Health Savings Accounts topped by catastrophic health insurance.

7. Conclusions

In this paper we have pooled annual cross sections of US personal income tax return data from the 1980s to study the sensitivity of deductions of medical expenditures with respect to income and tax parameters. The 1980s are an excellent period to conduct this work because there were significant tax reforms (Equity and Fiscal Responsibility Act of 1982 and the Tax Reform Act of 1986) that substantially changed tax rates and other

parameters of the tax system affecting medical deductions, including in particular the Adjusted Gross Income floor. These policy changes generated extensive, exogenous variation in the data that allow us to estimate econometrically some relevant elasticities that characterize taxpayers' deduction behavior. We explore the data with a special focus on the itemization decision by using a methodology that relies both on the public finance empirical literature about tax instruments and on the Heckman selection model so as to endogeneize itemizing.

The results for overall medical deductions were obtained using data from 1980 up to 1989. The estimated income elasticity was 0.37, the tax price elasticity was –1.1 and the elasticity with respect to the AGI limit was –2.26. These elasticities for medical expense deductions are roughly consistent with a 0.62 income elasticity and a –0.65 price elasticity for the demand for health care.

These findings indicate that taxpayers' medical deductions are quite responsive to tax policy parameters. They should be taken into account when thinking about using tax policy instruments for health policy goals.

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APPENDIX

TABLE A.1
Probit for Itemization, 1980-1989

Probit estimates — Number of obs = 957660; Wald chi2(84) = 117106.77; Prob > chi2 = 0.0000

Log pseudo-likelihood = -402354.9 — Pseudo R2 = 0.3767

Item	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
share_inty	.6309891	.0216712	29.12	0.000	.5885143	.6734639
share_divagi	.7160944	.032333	22.15	0.000	.6527229	.7794658
share_schedc	-.0570601	.0166941	-3.42	0.001	-.0897799	-.0243404
share_cgagi	-.2980005	.0292036	-10.20	0.000	-.3552385	-.2407625
share_setax	5.084214	.1801527	28.22	0.000	4.731121	5.437307
ltxprice4	-2.168257	.0479477	-45.22	0.000	-2.262233	-2.074281
lecinc	1.014099	.0109303	92.78	0.000	.9926756	1.035521

Note: Variables are the ratio of interest, dividends in AGI, Schedule C income, capital gains, and self-employment tax to economic income. Ltxprice4 is the marginal tax rate at standard deductions.