ELSEVIER

Journal of Public Economics 90 (2006) 2285 – 2301

JOURNAL OF PUBLIC ECONOMICS

www.elsevier.com/locate/econbase

Employee cost-sharing and the welfare effects of flexible spending accounts

William Jack [a], Arik Levinson [b,*], Sjamsu Rahardja [c]

[a] Georgetown University, USA
[b] Georgetown University, USA
[c] World Bank, USA

Received 16 December 2005; received in revised form 5 April 2006; accepted 24 April 2006
Available online 14 June 2006

Abstract

Flexible Spending Accounts (FSAs) subsidize out-of-pocket health expenses not covered by employer-provided health insurance, making health care cheaper *ex post*, but also reducing the incentive to insure. We use a cross section of firm-level data to show that FSAs are indeed associated with reduced insurance coverage, and to evaluate the welfare consequences of this shift. Correcting for selection effects we find that FSAs are associated with insurance contracts that have coinsurance rates about 7 percentage points higher, relative to a sample average coinsurance rate of 17%. Meanwhile, coinsurance rates net of the subsidy are approximately unchanged, providing evidence that FSAs are only welfare neutral if we ignore distributional considerations and the deadweight loss of the taxes necessary to finance the subsidy. These results also suggest that FSAs may explain a significant fraction of the shift in health care costs to employees that has occurred in recent years.

JEL classification: D60; H21; I18
Keywords: Health expenditure subsidies; Moral hazard; Flexible Spending Accounts

1. Introduction

For half a century, health insurance premiums paid by employers on behalf of their employees have been exempt from income taxation in the US. This exemption amounts to an unbalanced subsidy for health care: insurance premiums are paid with pre-tax dollars, while out-of-pocket

* Corresponding author.
E-mail addresses: wgj@georgetown.edu (W. Jack), aml6@georgetown.edu (A. Levinson), srahardja@worldbank.org (S. Rahardja).

0047-2727/$ - see front matter
doi:10.1016/j.jpubeco.2006.04.003

expenses must be paid with after-tax income. The imbalance tilts insurance towards larger premiums and smaller out-of-pocket expenses, resulting in excessive coverage and inefficient overuse of medical care (Pauly, 1986; Feldstein, 1973).

Two recent proposals would balance the tax treatment of premiums and out-of-pocket health expenses. In November 2005, the President's Advisory Panel on Federal Tax Reform proposed capping the amount of health insurance that can be purchased with pre-tax dollars. This would mean that the marginal health insurance purchase for most individuals would trade off after-tax insurance premiums against after-tax out-of-pocket expenses. At the same time, others have proposed "full deductibility" of all medical expenses (Hubbard et al., 2004; Cogan et al., 2005). This would mean that marginal health purchases would trade pre-tax premiums against pre-tax out-of-pocket costs.

In this paper we examine Flexible Spending Accounts (FSAs), a 1978 policy under which some employers have allowed employees to set aside pre-tax income to pay out-of-pocket expenses. These accounts provide a source of variation in the tax treatment of health expenses that can be used to study two broader implications of full deductibility. First, we ask whether deductibility reduces the incentive to insure, increasing the out-of-pocket costs of health insurance offered by employers with FSAs. Second, we examine whether FSAs, by subsidizing out-of-pocket costs, reduce the inefficiency associated with subsidizing premiums in the first place.

In addition, while we do not have time-series data on FSA use and out-of-pocket costs, our study may shed light on recent increases in the employee share of health costs. Fifty-one percent of firms surveyed in 2003 expected to increase employee contributions to premiums, and 15% of large firms intended to increase employees' coinsurance rates.[1] Coinsurance rates for preferred prescription drugs rose from 21 to 26% from 2001 to 2004, and average deductibles rose 85% from 2000 to 2005. These trends may be partly explained by the growing use of FSAs. If out-of-pocket costs are tax subsidized via FSAs, employees may be better off trading less generous insurance for some other form of compensation.

Employer-provided health insurance was first subsidized in 1954 when premiums paid by employers were exempted from their employees' taxable income. This exemption subsidizes purchases of health insurance at the employee's marginal income tax rate, and induces individuals to buy more generous insurance than they otherwise would (Pauly, 1986).[2] In 1978, Section 125 of the Internal Revenue Code extended the tax exemption for health insurance so that now the full premium receives a subsidy regardless of whether it is paid by the employer or employee.

Section 125 has also been extended to exempt out-of-pocket payments from taxable income, through the use of FSAs. Individuals with access to FSAs can make periodic contributions from pre-tax income. These tax-free funds can then be used to reimburse qualified costs, including deductibles, copayments, and coinsurance obligations that are part of an insurance policy, or simply to pay for uninsured medical expenses.[3]

Since their introduction the use of FSAs has been growing. About 22% of employers administered FSAs in 1993. By 2003, 83% of very large firms offered FSAs (up from 69% in 1999),

[1] Kaiser Family Foundation and HRET, 2004, page 116.

[2] Plan generosity could mean either the extensive or intensive margins. Generosity increases if certain services (mental health, maternity, etc.) are added to coverage, or if the share of costs of services covered by the plan rises.

[3] Any unused funds in the FSA are forfeited at the end of the year, inducing individuals first to be realistic when making initial FSA allocations, and second to accelerate expenditures near the end of the year if health expenses have been smaller than expected. (Recent changes allow unused FSA contributions to be rolled over for a $2\frac{1}{2}$ month grace period in the subsequent year.) Despite these non-linearities in the subsidy regime, in most of this paper we treat the deduction of out-of-pocket expenses as open-ended.

as did 76% of large firms, 57% of midsize firms, and 14% of small firms.[4] Tax expenditures for these Section 125 plans, to which contributions for both medical care and dependent care expenses can be made, amounted to an estimated \$24 billion in 2005 (Joint Committee on Taxation, 2005).

Few studies have investigated the effects of FSAs on employer-provided health insurance. Levy (1998) shows that a firm is more likely to offer an FSA if it employs more workers with a high demand for insurance and that employee premium contributions increase with the marginal tax rate. Cardon and Showalter (2001) find that FSA participation increases with income and the foreknowledge of medical expenditures. Dowd et al. (2001) show that Section 125's employee-paid premium subsidy, like the exclusion of employer-paid premiums, distorts employees' insurance decisions.

Two studies have suggested explanations for the rise in employee contributions to employer-provided health insurance, though neither focuses on FSAs. Gruber and McKnight (2003) find that falling marginal income tax rates, rising HMO penetration, increasing Medicaid eligibility, and rising health care costs explain more than half of the run-up in employee contributions. Dranove et al. (2000) show that the rise in two-income households explains part of the shift, as employers try to induce their employees to rely on their spouses' employers' benefits. Our study is the first to look at FSAs as a potential cause of the rise in out-of-pocket health care costs.

Identifying the effect of FSAs on health insurance choices is important for two reasons. First, it improves our understanding of trends in coverage rates over time and the likely effects of proposed tax policy changes (i.e., full deductibility) on insurance coverage. The second reason is more normative. If, by subsidizing out-of-pocket expenditures, FSAs induce further over-consumption of medical care, then FSAs will exacerbate the distortion associated with the existing subsidy to premiums. But FSAs could lead individuals to purchase plans with higher nominal coinsurance rates. If this effect is large enough, and effective (i.e., net-of-subsidy) coinsurance rates increase, then FSAs could partially correct the distortion introduced by the premium subsidy.

We estimate the effect of an employer offering an FSA on the coinsurance rate associated with the employer's health plans, using IV techniques to account for selection effects. Our estimates suggest that FSAs increase the coinsurance rate for the average health care plan by 7 percentage points relative to a sample average of 17%. This difference is large enough that the *effective* (net-of-subsidy) coinsurance rate is on average approximately unchanged. We calculate that FSAs are at best welfare neutral, and only if we ignore their distributional effects and the deadweight loss of raising taxes to finance them.

2. Insurance choice in the presence of FSAs

Insured individuals are typically required to share some of the costs of health care, to mitigate the induced incentive to over-spend, or moral hazard (Pauly, 1968). Jack and Sheiner (1997) analyze the optimal degree of cost-sharing in a simple model in which insurance contracts are characterized by a premium and a coinsurance rate – the latter being the proportion of incurred medical costs that must be paid out-of-pocket by an individual. Uncertain health is modeled by assuming that the cost or price of improving health is uncertain, and is represented by a parameter $\theta \in [\theta_0, \theta_1]$. Thus, if H is an individual's health and C is his consumption of other goods, then his

[4] 1993 RWJ Employer Provided Health Insurance Survey and Kaiser (2004).

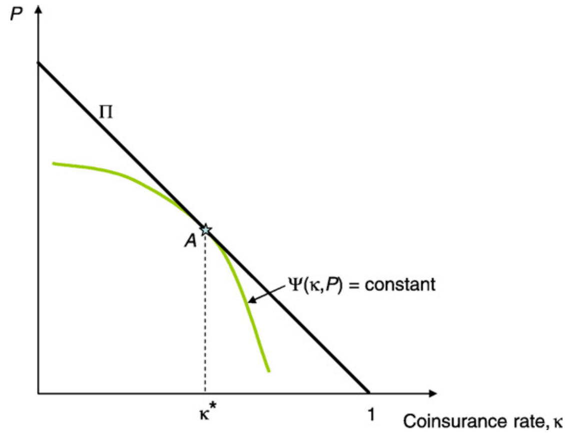

Fig. 1. The optimal insurance contract when neither premiums nor out-of-pocket expenses are subsidized.

expenditure is $C+\theta H$. A less healthy individual must spend more, θH, on medical care to attain the same health.[5]

Consider a representative consumer with (state-independent) utility $U(C,H)$.[6] Income, denoted by W, is exogenous and fixed. Given a coinsurance rate of κ and premium P, in health state θ a consumer chooses health and consumption by solving

$$\max_{C,H} U(C,H) \quad s.t. \; W-P = C + \kappa\theta H.$$

Demand for health is denoted $H(\kappa\theta,W-P)$, and demand for the consumption of other goods is $C(\kappa\theta,W-P)$. Indirect utility is $V(\kappa\theta,W-P)=U(C(\kappa\theta,W-P), H(\kappa\theta,W-P))$.

The consumer chooses κ and P to maximize expected utility, $\Psi(\kappa,P)$, subject to the insurer's zero profit condition:

$$\max_{\kappa,P} \Psi(\kappa,P) = \int_{\theta_0}^{\theta_1} V(\kappa\theta, W-P)dF \quad s.t. \quad P = (1-\kappa)\int_{\theta_0}^{\theta_1} \theta H dF \tag{1}$$

where θ is distributed according to the cdf $F(.)$. After rearranging the first order conditions and applying Roy's identity (see Jack and Sheiner, page 209), the optimal coinsurance rate satisfies

$$\text{cov}(q,\alpha) = -\bar{\alpha}(1-\kappa)\frac{d\bar{q}}{d\kappa}, \tag{2}$$

[5] This interpretation can be derived from a simple health production function model. Assume that θ represents generic health status, and health, H, is produced under constant returns to scale from inputs z, with

$$H = f(z,\theta) = z/\theta.$$

Thus θ determines the productivity of health inputs. If input prices are p, then the minimum cost of attaining health H in state θ is $c(H,\theta)=p\theta H$. If p is normalized to unity, θ can be interpreted as the price of health.

[6] By assuming a representative consumer we ignore heterogeneity in tax rates and FSA take-up rates and are free to assume lump-sum taxation to finance the subsidies. Any welfare effects we identify will need to be corrected for the heterogeneous effects on different individuals and the deadweight loss of raising taxes in a distortionary fashion. We address these issues below.

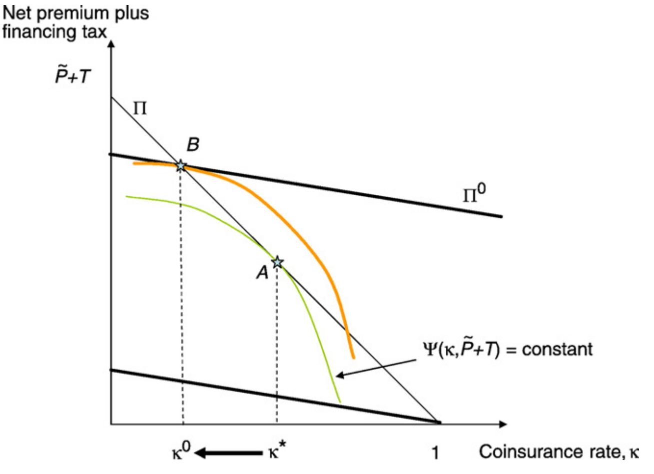

Fig. 2. The optimal insurance contract when premiums are subsidized at the marginal tax rate, τ. The subsidy reduces the coinsurance rate from κ^* to κ^0 and decreases welfare.

where $q \equiv \theta H$ is health spending, and $\alpha \equiv V_2$ is the marginal utility of income, both of which are state-dependent. Bars denote means.

Fig. 1 illustrates the optimal choice of insurance contract described by Eq. (2). Expected utility is increasing towards the origin. Π is the zero profit locus. Though we have drawn Π as a straight line for expositional clarity, in fact it will be convex. If people respond to lower coinsurance rates by purchasing more health care, then decreases in coinsurance rates require successively larger premium increases in order to remain actuarially fair. When the coinsurance rate is one, there is no insurance, so the premium is zero. The premium is highest when the individual is fully insured against medical costs ($\kappa=0$). Assuming expected utility $\Psi(\kappa,P)$ is well-behaved, the optimal coinsurance rate characterized by (2) is depicted at point A and denoted κ^*.

The effects of the subsidy to premium payments can best be seen by focusing on the *net* premium, $\tilde{P}=P(1-\tau)$, where τ is the individual's marginal income tax rate. The insurer's zero profit constraint, in terms of the net premium, is

$$\frac{\tilde{P}}{(1-\tau)} = (1-\kappa)\bar{q}. \tag{3}$$

Expected health expenditures, $\bar{q}$, are a function of the coinsurance rate and the individual's income net of insurance premiums and taxes paid: $(W-\tilde{P}+T)$, where T is a lump-sum tax used to finance the subsidy. In Fig. 2 the vertical axis measures the total *ex ante* payment associated with the purchase of health insurance, $\tilde{P}+T$. The effect of the subsidy is thus to flatten and shift the zero profit line in Fig. 1 to Π^0.[7,8] The optimal insurance policy (B) must still lie on the old zero profit line Π, but at a point where the individual's indifference curve is tangent to Π^0. As depicted, the subsidy induces individuals to choose more generous insurance, $\kappa^0<\kappa^*$ (see Jack and Sheiner, Proposition 1), and causes individuals to purchase inefficiently generous insurance policies.

[7] This can most easily be seen by supposing that q is fixed, and comparing Eq. (3) with the constraint in (1).

[8] Without taking account of the tax revenue required to finance this subsidy, the new budget line would pivot around the point $\kappa=1$, as shown in Fig. 2. However, this is of limited use for welfare analysis.

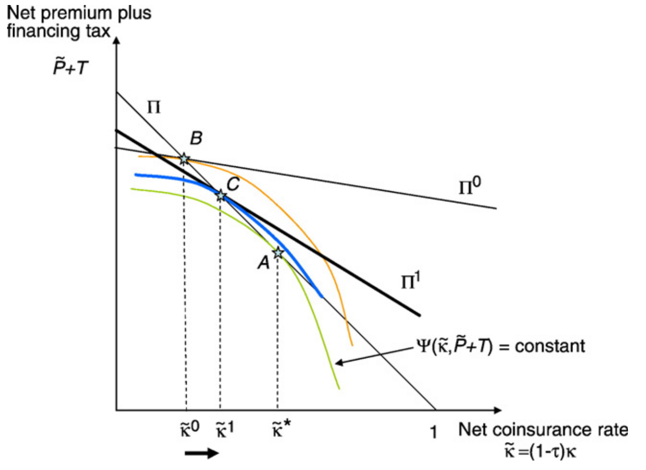

Fig. 3. Optimal insurance when premiums and out-of-pocket expenses are both subsidized at a rate τ. The net coinsurance rate increases from $\tilde{\kappa}^0$ to $\tilde{\kappa}^1$, and welfare improves.

Finally, if out-of-pocket expenditures are also subsidized at the same rate τ, then the zero profit line rotates and shifts once again, as shown in Fig. 3 to Π^1. In this figure, as before, the net premium (plus lump-sum tax) is shown on the vertical axis, while now the net coinsurance rate $\tilde{\kappa}=(1-\tau)\kappa$ is shown on the horizontal axis. The zero profit condition, in terms of $\tilde{P}$ and $\tilde{\kappa}$, is

$$\tilde{P} = (1-\tau-\tilde{\kappa})\bar{q} \tag{4}$$

The subsidy to out-of-pocket spending steepens the budget line compared with Π^0, simply because a change in the net coinsurance rate of $d\tilde{\kappa}$ corresponds to a larger change in the gross rate, $d\kappa=d\tilde{\kappa}/(1-\tau)$, which generates a correspondingly larger change in the premium. However, the subsidy to out-of-pocket spending does not fully offset the premium subsidy, even though it is at the same rate.[9] The optimal insurance policy (C) again must lie on the old zero profit line Π, but at a point where the indifference curve is tangent to Π^1.

As drawn in Fig. 3, the effect of the subsidy to out-of-pocket payments is to increase the optimal coinsurance rate by so much that the *net* coinsurance rate, $\tilde{\kappa}^1$ rises above that prevailing under the premium subsidy regime alone, $\tilde{\kappa}^0$. This result relies on consumer indifference curves in $(\tilde{\kappa}, \tilde{P}+T)$–space becoming successively steeper as we move down the original budget line. Jack and Sheiner (Proposition 2) show that if the demand for health care is inelastic with respect to the out-of-pocket price, then a small coinsurance subsidy does in fact induce such an increase in the net coinsurance rate. In this case, FSAs can partially undo the negative efficiency effects of premium subsidies.

However, it is also possible that indifference curves in $(\tilde{\kappa}, \tilde{P}+T)$–space become steeper near the top of the original zero profit line (above point B). In this case, there could be a second equilibrium in which the out-of-pocket subsidy induces consumers to choose a lower net

[9] To see this, note from (4) that the slope of the budget line in the presence of both the premium and coinsurance subsidies is $\tilde{P}'(\tilde{\kappa})=(1-\tilde{\kappa})\bar{q}'(\tilde{\kappa})-\bar{q}(\tilde{\kappa})-\tau\bar{q}'(\tilde{\kappa})$. In the absence of the subsidies τ is effectively zero, so $P\equiv\tilde{P}$ and $\kappa\equiv\tilde{\kappa}$, and the slope of the budget line is simply $\tilde{P}'(\tilde{\kappa})=(1-\tilde{\kappa})\bar{q}'(\tilde{\kappa})-\bar{q}(\tilde{\kappa})$, which is more negative that the slope of the subsidized budget line, since $\bar{q}'(\tilde{\kappa})<0$.

Table 1
Data summary statistics

Insurance plan characteristics	No FSA [n=5487]		With FSA [n=1904]	
	Mean	SD	Mean	SD
Single premium	160.3	77.1	152.7*	66.6
Family premium	392.4	159.7	385.1†	135.5
Coinsurance rate[a]	16.8	10.7	17.7*	8.7
Copayment	8.38	5.36	8.85	4.33
Deductible	349.7	399.0	347.6	365.9
Employer share of single premium	83.3	25.4	80.5	21.9
Employer share of family premium	64.7	34.6	64.8	27.8
Blue Cross/Blue Shield	0.33	0.47	0.27*	0.44
Covers prescription drugs	0.83	0.37	0.92	0.26
Covers prenatal	0.88	0.32	0.96*	0.19
Covers dental	0.28	0.45	0.35*	0.48
Covers maternity	0.88	0.32	0.97*	0.16
Covers alcoholism related illness	0.86	0.35	0.95*	0.21
Limits out-of-pocket expenses	0.89	0.31	0.95*	0.21
	No FSA [n=5039]		With FSA [n=1486]	
Firm characteristics	Mean	SD	Mean	SD
Number of plans offered	1.34	0.81	1.89*	1.39
Proportion of self insured	0.19	0.39	0.47*	0.50
Number of employees in the location	44.2	151.3	154.6*	405.7
Firm's age	28.9	27.0	44.0*	38.4
Percent employees older than 54 years old	12.0	16.8	9.6*	12.0
Percent female employees	40.7	28.8	46.1*	29.9
Percent employees joining labor union	5.8	20.1	6.7	19.4
Marginal tax rate (%)	31.3	7.4	32.6*	7.8
Payroll per worker (000)	25.4	18.3	28.0*	19.8
Percent employees eligible for HI	86.7	23.2	89.4*	19.1
Percent corporate	0.80	0.40	0.79	0.41
Percent unincorporated	0.11	0.32	0.06*	0.23
Percent non-profit	0.09	0.29	0.16*	0.36
Percent with no competitor in the state	0.82	0.38	0.77*	0.42
Percent have location in other states	0.37	0.48	0.65*	0.46

Source: RWJ Employer Health Insurance Survey 1993.
Notes: Private firms offering health insurance with non-missing values of variables above. 7391 insurance plans for 6525 firms, 1486 of which offer an FSA program. States are CO, FL, MN, NM, NY, ND, OK, OR, VT and WA.
*, † Difference of sample means or proportions is significant at 5% and 10%, respectively.
[a]Twenty percent (1456) of the plans had coinsurance rates of zero.

coinsurance rate, which would be welfare-reducing. The measured effect of FSAs on net co-insurance rates can thus be used to assess the average welfare effects of the tax policy.

3. Data and empirical strategy

The previous section demonstrates two important potential consequences of FSAs. First, subsidizing out-of-pocket expenses could cause a nominal shift in health care costs from employers to employees. It would be ironic if public policy were in part accountable for this phenomenon that has generated so much attention. Second, the subsidy to out-of-pocket expenses may mitigate the welfare loss from the underlying subsidy to premiums. As illustrated by Fig. 3, FSAs are efficiency enhancing on average if they cause the net coinsurance rate with the subsidy to increase.

3.1. Data

To investigate these issues empirically we use the 1993 Employer Health Insurance Survey (EHIS) from the Robert Wood Johnson Foundation. The EHIS is a cross-section of firm-level data on health insurance plans offered by employers in 10 U.S. states. The survey has two parts. The first has information about health insurance plans, including coverage, premiums, and coinsurance rates. The second part contains information about the firms, including industrial classifications, employees, payrolls, unionization, and organizational forms.

We focus on a subsample of the EHIS comprising 6525 firms that have payrolls per worker greater than the full-time minimum wage and offer at least one health insurance plan that is not an HMO or a PPO. These firms offer 7391 different insurance plans, and 25.8% of them provide FSAs.

The EHIS is the best publicly available source to examine the deductibility of out-of-pocket health expenses. However, it has a number of limitations. First, the 12-year-old data in the EHIS cannot directly address the recent growth in out-of-pocket costs borne by employees. Nonetheless, we expect that the mechanisms by which FSAs affect the structure of insurance policies are likely to have remained operative over time.

Second, we do not know the take-up rates for different policies within each firm. For most of the paper, our unit of observation is the insurance plan. We recognize that some unobserved plan characteristics may be correlated across plans within firms, and we test the robustness of our results by running some specifications where the unit of observation is the firm, and plan characteristics are simple averages across all the plans offered by each firm.

Third, out-of-pocket payments come in a variety of forms: deductibles, copayments, and coinsurance rates, often with some sort of annual cap, and uncovered services. We focus on the coinsurance rate: the share of costs borne by the employee, after the deductible has been met but before any maximum out-of-pocket cost, expressed as a percentage. In robustness checks we demonstrate that the per-visit copayment, expressed in dollars, works equally well. Since HMO and PPO plans typically do not include proportional cost-sharing, we exclude them from our sample.

Table 1 provides descriptive statistics. Consistent with our expectations based on Section 2, health insurance plans offered by firms with FSAs have lower premiums and higher coinsurance rates. Of course, plans associated with FSAs also differ in many other respects. They are more likely to cover certain services, and the firms that offer them have more and better-paid employees, are older, and are less likely to be unincorporated and for-profit.

The key determinant of the value of the FSA subsidy, and of the welfare consequences of FSAs, is the marginal income tax rate faced by the plan's members, τ. To construct a proxy for τ, we compute the average income per worker for each firm, and assume this constitutes these employees' entire incomes. We then let the NBER TAXSIM model compute the federal and state marginal tax rates by assuming that all workers are single taxpayers with no dependents and standard deductions, and adding 7.65% to account for payroll taxes (6.2% for Social Security and 1.45% for Medicare).[10] Firm differences account for about 85% of the variation in τ, and state differences account for the remainder.

[10] While we do not attempt to approximate the economic incidence of these taxes, it does not matter what fraction we add to state and federal taxes so long as we use the same fraction for all of the plans. We revisit this issue below when we discuss the effect of FSAs on net-of-tax coinsurance rates.

Table 1 shows that health plans associated with FSAs have higher coinsurance rates, lower premiums, and members that are likely to face higher marginal tax rates. To ask whether FSAs may have caused the increase in employee out-of-pocket payments, and whether the net after-tax coinsurance rate is higher than the gross rate would be without the FSA subsidy, we need to control for differences between firms with and without these accounts.

3.2. Empirical strategy

Ideally, we would like to assess the effect of offering an FSA on the average health care plan's coinsurance rate. Estimating this average treatment effect faces two distinct problems, one relating to endogenous regressors, and the other to selection effects.

First, since coinsurance rates and premiums are related through the zero profit constraint (illustrated in Fig. 1), an econometric model designed to identify the effect of FSAs on co-insurance rates must control for premium differences across plans. However, the observed variation in premiums is unlikely to be exogenous, thereby contaminating the estimate of the FSA effect. Instead, we estimate a reduced form where the coinsurance rate is estimated as a linear function of exogenous variables that affect premiums, and which should not in theory affect the coinsurance rate. These include state indicator variables (to account for regional health care cost differences), plan coverage, firm size and unionization rates.

The second obstacle to estimating whether coinsurance rates are higher for firms with FSAs is that firms' decisions to offer FSAs are not exogenous. Some firms may simply have better employee benefits, including more generous health insurance plans, lower coinsurance rates, FSAs, and other unmeasured attributes. In other words, for the average firm, adopting an FSA could in theory cause it to have higher coinsurance rates. But firms that have adopted FSAs are the generous ones, which also have lower coinsurance rates. A simple regression of coinsurance rates that fails to account for the endogenous decision to adopt an FSA will likely understate the positive effect of FSAs on coinsurance rates.

Alternatively, some unmeasured phenomenon may be driving up coinsurance rates for some firms relative to others. If these firms react to higher coinsurance rates by establishing FSAs, a simple regression of coinsurance rates on FSAs will suffer a simultaneity bias in the opposite direction, and likely overstate the effect.

We estimate the treatment effect of FSAs on coinsurance rates in two ways. First we assume the effect is independent of the observable characteristics $\mathbf{X}$,

$$\kappa = \mathbf{X}\beta + \boldsymbol{F}\gamma + v \tag{5}$$

where $\mathbf{X}$ is a matrix of covariates, $\boldsymbol{F}$ is a vector of dummy variables equal to one if the plan's firm has an FSA, and γ is the parameter we are interested in. To account for the endogeneity of FSAs, we follow Heckman and Robb (1985). We predict $\boldsymbol{F}$ using a probit regression, including variables $\mathbf{Z}$ not included in $\mathbf{X}$ and then use the predicted probabilities as instruments in (5).

Our second specification weakens the ignorability of treatment assumption inherent in (5) by allowing the treatment effect itself to be related to the covariates.

$$\kappa = \mathbf{X}\beta + \boldsymbol{F}\gamma + \boldsymbol{F}(\mathbf{X}-\overline{\mathbf{X}})\delta + e \tag{6}$$

where γ is the treatment effect at the average value of the covariates. Again we estimate (6) instrumenting for $\boldsymbol{F}$.

Table 2
First-stage probit of FSA offering

Instruments		
Firm's age	0.005*	(0.001)
Percent employees eligible for health insurance	0.003*	(0.001)
Has location in other states	0.553*	(0.037)
Exogenous regressors		
Marginal tax rate	0.010*	(0.003)
Percent employees joining labor union	−0.002*	(0.001)
Payroll per worker (000)	0.078	(1.174)
Percent employees older than 54 years old	−0.005*	(0.001)
Percent female employees	0.002*	(0.001)
Number of employees in the location	0.007*	(0.001)
Blue Cross/Blue Shield	−0.136*	(0.042)
Covers prescription drugs	0.115*	(0.058)
Covers prenatal	0.013	(0.115)
Covers dental	0.015	(0.038)
Covers maternity	0.457*	(0.125)
Covers alcoholism related illness	0.252*	(0.066)
Limits out-of-pocket expenses	0.272*	(0.071)
Unincorporated	−0.172*	(0.069)
Non-profit	0.201*	(0.066)
Construction	0.083	(0.162)
Mining and manufacturing	0.507*	(0.142)
Transport and communications	0.626*	(0.149)
Wholesale trade	0.111	(0.145)
Retail trade	0.158	(0.141)
Finance and real estate	0.589*	(0.141)
Professional services	0.435*	(0.144)
Other services	−0.010	(0.173)
Florida	−0.217*	(0.091)
Minnesota	0.025	(0.087)
New Mexico	−0.283*	(0.088)
New York	−0.435*	(0.086)
N. Dakota	0.179*	(0.082)
Oklahoma	−0.265*	(0.092)
Oregon	−0.162†	(0.093)
Vermont	−0.190*	(0.087)
Washington	−0.323*	(0.097)
Constant	−3.014*	(0.224)
N	7,391	
Pseudo-R2	0.170	
Chi^2	1091	
$\text{Chi}^2(5)$ of instruments	358	

Robust standard errors in parenthesis. * significant at 5%, †significant at 10%.

In sum, we first estimate $P(\text{FSA}=1|\mathbf{X},\boldsymbol{Z})$ by a probit, where $\boldsymbol{Z}$ is a vector of instruments. We then estimate Eqs. (5) and (6) using instrumental variables, where (6) includes interactions between the FSA dummy and the difference between the covariates and their means.

As instruments we use the age of the firm, whether the firm has out-of-state locations, and the percentage of employees eligible for health insurance. Firm age works well as an instrument because older firms are more likely to offer FSAs, and are unlikely to have different coinsurance

Table 3
Estimation results of the coinsurance equation

Dependent variable: coinsurance rate	OLS		IV	
	(1)	(2)	(3)	(4)
FSA	0.742*	1.365*	3.993*	6.841*
	(0.262)	(0.342)	(1.025)	(1.878)
Percent employees joining labor union	−0.011*	−0.012†	−0.010†	−0.006
	(0.005)	(0.006)	(0.005)	(0.009)
Marginal tax rate	0.026	0.023	0.010	0.026
	(0.024)	(0.028)	(0.025)	(0.043)
Payroll per worker (000)	−0.009	0.001	−0.010	−0.006
	(0.010)	(0.012)	(0.010)	(0.018)
Percent employees older than 54 years old	−0.011	−0.012	−0.008	−0.006
	(0.007)	(0.008)	(0.008)	(0.012)
Percent female employees	0.007	0.009	0.004	0.006
	(0.005)	(0.006)	(0.005)	(0.009)
Number of employees in the location	0.006	0.009	−0.004	−0.008
	(0.004)	(0.007)	(0.005)	(0.038)
Blue Cross/Blue Shield	−1.174	−1.586*	−0.972*	−2.128*
	(0.286)	(0.332)	(0.300)	(0.509)
Covers prescription drugs	0.204	0.332	0.067	−0.597
	(0.401)	(0.445)	(0.402)	(0.683)
Covers prenatal	0.690	1.008	0.682	3.267†
	(0.841)	(0.905)	(0.839)	(1.681)
Covers dental	−0.252	−0.557†	−0.296	−1.142*
	(0.252)	(0.315)	(0.255)	(0.544)
Covers maternity	−1.577†	−1.205	−2.006*	−3.316†
	(0.898)	(0.938)	(0.901)	(1.821)
Covers alcoholism related illness	0.408	0.650	0.167	0.394
	(0.424)	(0.458)	(0.431)	(0.685)
Limits out-of-pocket expenses	1.620*	1.591*	1.374*	2.165*
	(0.461)	(0.487)	(0.472)	(0.789)
Unincorporated	−1.761*	−1.593*	−1.531*	−2.060*
	(0.433)	(0.479)	(0.443)	(0.730)
Non-profit	−0.350	−0.229	−0.591	0.579
	(0.451)	(0.542)	(0.460)	(1.003)
FSA*Dev[marginal tax rate]	–	0.003	–	−0.070
		(0.041)		(0.100)
FSA*Dev[payroll per worker (000)]	–	−0.033†	–	−0.019
		(0.018)		(0.043)
FSA*Dev[percent unionized]		0.002		−0.011
		(0.012)		(0.029)
FSA*Dev[percent employees>54 years old]		0.003		0.004
		(0.018)		(0.050)
FSA*Dev[percent female employees]		−0.007		−0.014
		(0.009)		(0.027)
FSA*Dev[number of employees in the location]		−0.003		0.001
		(0.008)		(0.050)
FSA*Dev[Blue Cross/Blue Shield]		1.510*		5.221*
		(0.555)		(1.630)
FSA*Dev[covers prescription drugs]		−0.732		2.983
		(0.966)		(3.024)
FSA*Dev[covers prenatal]		−1.872		−14.20†
		(2.400)		(7.62)

(continued on next page)

Table 3 (*continued*)

Dependent variable: coinsurance rate	OLS		IV	
	(1)	(2)	(3)	(4)
FSA*Dev[covers dental]		1.059		2.618
		(0.503)		(1.449)
FSA*Dev[covers maternity]		−5.930		1.624
		(3.296)		(13.078)
FSA*Dev[covers alcoholism related illness]		−2.132†		−2.334
		(1.166)		(3.704)
FSA*Dev[limits out-of-pocket expenses]		0.087		−6.095
		(1.426)		(4.811)
FSA*Dev[unincorporated]		−1.370		4.372
		(1.075)		(3.445)
FSA*Dev[non-profit]		−0.280		−3.548
		(0.834)		(2.422)
Industry dummies (9)	yes	yes	yes	yes
State dummies (10)	yes	yes	yes	yes
N	7391	7391	7391	7391
F-test	7.25*	5.44*	7.31*	5.07*
Wu–Hausman endogeneity test of FSA (and interaction variables) Ho: regressors are endogenous			9.61*	2.57*
F-test Ho: interaction terms = 0		2.24*		2.09*

Robust standard errors in parenthesis, *, †significant at 5% and 10%, respectively.

rates, all else equal. To address concerns that firm age really captures some other unmeasured attribute correlated with both FSAs and cost-sharing, we show below that our results hold if firm age is excluded from the instrument set, if it is the only instrument, and if it is included as a step function rather than a continuous variable.

Our second instrument is a dummy for multi-state firms, because they might have economies of scale in administering payroll programs such as FSAs, and on the theory that having affiliates in multiple states is more likely exogenous than the level of employment. However, if firm-wide scale economies affect both health costs and coinsurance rates, this too will be a problem. We show that our results are robust to the exclusion of this instrument, and to the inclusion of employment directly as an instrument.

Finally, we include the fraction of the plant's workforce that is eligible for health insurance as a measure of the benefits to the firm of establishing an FSA. Again, to address worries that this may be associated with unobserved plant characteristics related to lower coinsurance rates, we show that dropping this instrument does not alter our findings. We include each of these dropped instruments in the main Eqs. (5) and (6), and none appear at all statistically significant.

Table 2 presents the results of the first stage probit, which estimates the probability that a firm offers an FSA. The unit of observation is a firm-specific health insurance plan. The first three covariates listed in Table 2 are the instruments, $\boldsymbol{Z}$, and are excluded from the second stage regressions of coinsurance rates. Health insurance plans are more likely to be associated with firms that offer FSAs if those firms are older, have more employees eligible to participate in health insurance benefits, and have locations in multiple states. Each 10 years of firm age adds about 1.5 percentage points to the probability that a firm offers an FSA; each 10% increase in the share of employees eligible for health insurance adds about 1 percentage point to the probability of offering an FSA; and multi-state firms are 16% more likely to have FSAs.

Turning to the exogenous covariates in Table 2, a 10% increase in marginal tax rates increases the FSA probability by 3 percentage points, and a 10% increase in the fraction of female employees increases the FSA probability by 0.6 percentage points. Prescription drug coverage increases FSA probabilities by 3 percentage points; alcoholism coverage by 7 percentage points; and maternity benefits by 11 percentage points.

3.3. Results

Table 3 presents our central estimates of Eqs. (5) and (6). As a benchmark, column (1) presents a simple OLS version of (5), not accounting for the selection by firms as to whether to offer an FSA. The dependent variable is the coinsurance rate, expressed as a number between 0 and 100. Health insurance plans associated with FSAs have coinsurance rates that are 0.74 percentage points greater than otherwise similar plans without FSAs. Though the coefficient is statistically significant and in the direction we expect, the magnitude is quite small.

Column (2) of Table 3 includes interactions between the FSA dummy and the difference between the firm and insurance plan characteristics and their means, as in Eq. (6). Because the interactions are differences-from-means, we can interpret the FSA coefficient (1.365) as the treatment effect for a firm with average characteristics. This effect is larger, but still small. Of course, the decision to offer an FSA is not exogenous, and hence we do not emphasize these first two benchmark columns.

Column (3) of Table 3 shows the results of an instrumental variables estimation of Eq. (5), using the predicted FSA probabilities from Table 2 as instruments. The average health care plan has a coinsurance rate that is 3.99 percentage points higher when offered in conjunction with an FSA, controlling for the selection by firms as to whether to offer an FSA. The average coinsurance rate in the sample is 17%, so a 4% increase amounts to a substantial average treatment effect (more on magnitudes below).

In column (4) of Table 3 we include the interaction terms. While few of the interactions are individually statistically significant, an *F*-test rejects the joint hypothesis that collectively they have zero effect on coinsurance rates. The average treatment effect reported in column (4) suggests that when provided in conjunction with FSAs, plans have coinsurance rates that are 6.8 percentage points higher than in the absence of FSAs.

At the bottom of Table 3 we report the *F*-statistic from a Wu–Hausman test of the exogeneity of the FSA regressor, easily rejecting unbiasedness and consistency for the OLS approach. Note also that the coefficients in columns (3) and (4) are larger than their OLS counterparts in columns (1) and (2), suggesting that the endogeneity of FSAs biases the OLS approach against finding a large average treatment effect. This would be true, for example, if firms that have adopted FSAs have more generous overall benefits, including low coinsurance rates.

3.4. Magnitudes and welfare implications

In the theory illustrated in Fig. 3, the subsidy to out-of-pocket costs increases the optimal coinsurance rate by so much that the *net* coinsurance rate rises above what it would have been absent the subsidy. To assess whether in fact net coinsurance rates rise, in the top row of Table 4 we calculate these differences for the average health care plan in our sample. The first column contains the estimate of $\hat{\gamma}$ from Eq. (6), 6.84. This represents the average increase in *gross* coinsurance rates: $\Delta\hat{\kappa}=\hat{\kappa}^1-\hat{\kappa}^0$, where the superscript 1 denotes the presence of an FSA. Without an FSA, the predicted *net* coinsurance rate is simply $\hat{\kappa}^0$, as taxes have no effect on what people pay out-of pocket. In column (2) of Table 4, we report the predicted value of this number for a plan without an FSA, at the average values of all other variables (15.65). With an FSA, the net coinsurance rate, becomes $\tilde{\kappa}^1=(1-\overline{\tau})\hat{\kappa}^1$, as out-of-pocket costs

Table 4
Magnitudes and robustness checks

	Average increase in gross coinsurance rate (γ)	$E[\kappa_i^0]$	Increase in *net* coinsurance for average plan: $E[1-\tau_i]E[\kappa_i^1]-E[\kappa_i^0]$
	(1)	(2)	(3)
Table 3 column 4	6.84 (1.88)	15.65 (0.46)	−0.20 (1.13)
First stage as linear probability model	7.99 (2.33)	15.28 (0.64)	0.71 (1.39)
Include number of plans as a RHS variable	7.17 (2.37)	15.58 (0.57)	0.05 (1.40)
Std errors clustered by firm	6.84 (2.20)	15.65 (0.50)	−0.20 (1.33)
Using firm averages (n=6525)	5.60 (2.04)	15.82 (0.45)	−1.10 (1.23)
Alternative instruments			
Drop all but firm age	5.98 (2.79)	15.93 (0.62)	−0.88 (1.65)
Age step function (≥5, ≥10) instrument	6.61 (2.19)	15.61 (0.61)	−0.35 (1.29)
Include no. of employees as instrument	6.72 (1.61)	15.70 (0.32)	−0.30 (0.99)
Drop firm's age	6.21 (2.39)	15.73 (0.65)	−0.66 (1.40)
Drop % employees eligible for insurance	6.90 (1.94)	15.66 (0.47)	−0.16 (1.16)
Drop has location in other states	5.90 (2.62)	15.92 (0.59)	−0.93 (1.56)
Eliminate observations where propensity score <0.1 or >0.7 (n=5440)	7.78 (3.32)	15.36 (1.13)	0.54 (1.94)
Alternative dependent variable: copayment	3.42 (0.94)	7.83 (0.23)	−0.10 (0.56)

Notes: The average marginal tax rate (state plus federal plus 7.65% Social Security and Medicare) in the sample is 31.3%, so $E[1-\tau_i]=0.687$ in column (3).
The dropped instruments were included in the 2nd stage coinsurance rate regressions, and none were statistically significant.

are subsidized at the average tax rate. In column (3) of Table 4 we report the difference in these net coinsurance rates, $\Delta\tilde{\kappa}=(1-\overline{\tau})\hat{\kappa}^1-\hat{\kappa}^0$.

This difference, $\Delta\tilde{\kappa}$, is −0.20 percentage points. Though negative, the difference is small and statistically insignificant, indicating that the FSA subsidy neither increases nor decreases net coinsurance rates on average.[11] FSAs appear to have increased health insurance plans' coinsurance rates by an amount sufficient to erase the tax advantages of participating in the plans. As suggested by Fig. 3, FSAs are therefore welfare neutral on average.

Of course, the true welfare effects depend on several considerations outside our model and our data. First, in our model the tax subsidy is financed by a lump-sum tax. If the FSA subsidy is financed by a distortionary tax, the average welfare effects will be adverse.

Second, we model a representative agent and have data only on firm averages. This ignores two important differences among individuals: marginal tax rates and FSA participation rates.[12] Our results suggest that for a person with the average marginal tax rate, coinsurance rates rise enough to offset the tax advantage of FSAs. Workers with high marginal tax rates will see their net coinsurance rates fall, which makes them better off individually but is socially wasteful because it

[11] This calculation depends on the tax rate. If we include all of the payroll taxes (15.3%), then the net coinsurance rate falls by 1.9 percentage points (instead of the 0.2 percentage points in Table 4), though this effect remains statistically insignificant. If we include none of the payroll taxes, the net coinsurance rate rises 1.5 percentage points, also statistically insignificant.

[12] While our data do not report take-up rates, we know from other sources that take-up rates are typically low. At one major public university, around 15% of employees participate in the FSA, and most participants are high-income individuals with large medical expenditures (Hamilton and Marton, 2006).

exacerbates the overuse of subsidized health care. Workers with low marginal tax rates and non-participants see their net coinsurance rates rise, which makes them worse off individually but is socially efficient. Seen in this light, FSAs constitute a socially wasteful subsidy to health care for high-income workers that is partly offset by efficiency gains at the expense of low-income workers.

3.5. Robustness

The rest of Table 4 demonstrates the robustness of these results using alternative specifications. First, in row 2 we report the predicted effect of FSAs on coinsurance rates if we use a linear probability model to predict FSA choice at the first stage, instead of a probit. The estimated effects are if anything larger with this change in specification.

Next, some readers may be concerned that our sample of 7391 insurance plans really only involves 6525 different firms. As one check, we include the number of plans offered by the firm as an additional control variable. (These include HMOs and PPOs not counted among our 7391 original observations.) This change has little effect on our central estimate, raising it from 6.84 to 7.17. We also tried clustering the standard errors by firm, in row 4, which raises the estimated standard error of the treatment effect from 1.88 to 2.20, and our result remains easily statistically significant. As a final way of addressing this concern about multiple plans, we tried a specification where the unit of observation is the firm rather than the insurance plan. We simply averaged the plan characteristics (coinsurance rate, etc.) for each firm. Here the central estimate (5.6) is still large and statistically significant, though perhaps muted slightly by the averaging of plan characteristics.

The next robustness checks use alternative instruments for predicting FSAs. Recall that the instruments used in Table 2 are (i) the firm's age, (ii) the percent of employees eligible for health insurance, and (iii) whether the firm has locations in other states. The most clearly exogenous among these is the firm's age, and so in Table 4 we report the results of a specification that drops the other two instruments. The magnitude of the estimated effect of FSAs falls a little, from 6.8 to 6.0, but remains significant, both statistically and economically. Out of concern that firm age might be correlated with some unobserved endogenous variable, and that firm age really only matters to FSA establishment in the first several years, we tried a version which represents firm age as a pair of dummy variables for firms 5 years or older and 10 years or older. The result (6.61) is nearly identical to our main specification.

We originally did not include the number of employees at a particular location as an instrument, thinking it would be correlated with the size of the risk pool and therefore the coinsurance rate. Size turned out to be insignificant in the second-stage regressions, and so in Table 4 we report the results of including the number of employees as an additional instrument. The main effect (6.72), remains large and statistically significant.

Next we dropped each of the three instruments in turn, and in each case included the dropped instrument as a right-hand-side variable in the second stage. None of the three appear crucial to our results, with the main effect varying between 5.9 and 6.9, and none of the three dropped instruments had statistically significant coefficients in the second stage.

As a last check on the instruments, we try to address the concern that firms with and without FSAs differ in so many dimensions. We examined the predicted probabilities from the first stage, and selected only those observations where the distribution of predicted FSA offerings overlapped most. We eliminated all those observations where the predicted probability of offering an FSA was below 0.1 (and very few firms actually did offer them), or above 0.7 (where very few firms did not). This excludes more than 25% of the sample, where the plans are most dissimilar in their characteristics that predict FSA offering. The estimated average treatment effect (7.78) is if anything larger than that from our base specification.

Finally, we have focused on the coinsurance rate, which is just one component of cost-sharing. To see whether other aspects of insurance respond in similar ways to FSAs, in the last line of Table 4 we report the results using the plans' copayments, expressed in dollars. On average, plans associated with FSAs have copayments that are $3.42 higher than those without FSAs, a difference that is statistically significant and amounts to more than a 40% increase in the average copayment.

4. Conclusions

Individuals with private health insurance in the United States have been paying an increasing share of their health care expenses out of pocket over the last decade. While this is likely due to a number of trends (demographics, falling tax rates, changes in the organization of health care delivery, etc.), one factor that may be important is the growth of Flexible Spending Accounts, which subsidize out-of-pocket payments. The potential role of this subsidy suggests that the observed shift to uninsured expenses may be partly illusory – net of the subsidy, out-of-pocket expenses have remained approximately constant.

In this paper, we have used cross-sectional data from an employer survey to address the link between the availability of FSAs and coinsurance rates. Without panel data we cannot be definitive about the trends in insurance arrangements in the US. Nevertheless, the cross-sectional analysis is instructive. When health insurance is offered in conjunction with an FSA, the coinsurance rate is about 7 percentage points higher. If we ignore the distortionary taxes necessary to finance the FSA subsidy, and the distributional consequences of FSAs, then our results suggest that the shift to out-of pocket spending is approximately welfare neutral, as the net-of-subsidy coinsurance rate is unchanged. If we do account for the cost of public funds and for distributional concerns, then FSAs are less likely to be welfare enhancing, and any efficiency gains come at the expense of low-income workers and are offset by efficiency costs for high-income workers.

Our estimate of the impact of FSAs on net coninsurance rates may be a lower bound on the effects of full deductibility of out-of-pocket expenses for two reasons. First, not all employees participate in FSAs, so our measured effect, 7 percentage points, would likely be higher with full participation or full deductibility. Second, average marginal tax rates probably overstate the benefits of FSAs, because the plans involve complicated reimbursement accounts and a use-it-or-lose-it feature. A straightforward tax deduction would be more valuable and may have a larger effect on net co-insurance rates. Of course, the distributional issues and financing costs identified above would continue to reduce any positive effects on welfare.

In sum, there is a curious irony in the gap between our findings here and the public concern about shifting health care costs from employers to employees: public policy in the form of FSAs may be partly accountable for that shift. Any welfare concerns about FSAs do not arise from the cost shift itself, because larger cost shifts mean greater efficiency. Rather, welfare concerns stem from distributional issues. The fact that the cost shift is just large enough to offset the subsidy on average means that once we account for the distortionary taxes necessary to finance the subsidy, FSAs involve an inefficient subsidy to health care for workers with high-incomes that is only partly offset by efficiency gains at the expense of workers with lower-incomes.

Acknowledgement

We thank Luca Anderlini, Phil Cross, Nada Eissa, Randy Ellis, Luca Flabbi, and Sherry Glied for discussions and/or comments.

References

Cardon, James, Showalter, Mark, 2001. An examination of flexible spending accounts. Journal of Health Economics 20, 935–954.

Cogan, John, F., Hubbard, R. Glenn, Kessler, Daniel P., 2005. Healthy, Wealthy, and Wise. AEI Press, Washington DC.

Dowd, Brian, Feldman, Roger, Maciejewski, Matthew, Pauly, Mark, 2001. The effect of tax-exempt out-of-pocket premiums on health plan choice. National Tax Journal 54 (4), 741–756.

Dranove, David, Spier, Kathryn, Baker, Laurence, 2000. Competition' among employers offering health insurance. Journal of Health Economics 19, 121–140.

Feldstein, Martin S., 1973. The welfare loss of excess health insurance. Journal of Political Economy 81 (2), 251–280.

Gruber, Jonathon, McKnight, Robin, 2003. Why did employee health insurance contributions rise? Journal of Health Economics 22 (6), 1085–1104.

Hamilton, Barton, Marton, James, 2006. Employee choice of flexible spending account participation and health plan. University of Kentucky Working Paper.

Heckman, James J., Robb, Richard, 1985. Alternative methods for estimating the impact of interventions. In: Heckman, James J., Singer, Burton (Eds.), Longitudinal Analysis of Labor Market Data. Cambridge University Press 1985, Cambridge.

Hubbard, R. Glenn, Cogan, John F., Kessler, Daniel P., 2004. Brilliant deduction. Wall Street Journal December 8.

Jack, William, Sheiner, Louise, 1997. Welfare-improving health expenditure subsidies. American Economic Review 87 (1), 206–221.

Joint Committee on Taxation, 2005. Estimates of Federal Tax Expenditures for Fiscal Years 2005–2008. US Government Printing Office, Washington DC. JCS-1-05.

Kaiser Family Foundation and Health Research and Educational Trust, 2004. Employer Health Benefits: 2004 Annual Survey, Menlo Park, California, and Chicago, Illinois.

Levy, Helen, 1998. Who pays for health insurance? Employee contributions to health insurance premiums. Working Paper, vol. 398. Industrial Relations Section, Princeton University.

Pauly, Mark, 1968. The economics of moral hazard: comment. American Economic Review 58, 531–537.

Pauly, Mark, 1986. Taxation, health insurance and market failure in the medical economy. Journal of Economic Literature 24, 629–675.