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Prevention and Private Health Insurance in the U.K.

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This paper investigates empirically how different insurance plans affect individual behaviours in terms of prevention activities in the U.K. The data come from the British Household Panel Survey. We test if purchasing private health insurance modifies the probability of exercising, undergoing regular check-ups and smoking. Based on both simple probits and an IV strategy, our results suggest that, in the U.K., contracting private health insurance does not lead to less prevention.

1. Introduction

Changes in individual behaviour induced by insurance coverage are one of the main concerns in insurance economics. In particular, the relationship existing between insurance and prevention activities has always been an important issue in the field. In their seminal paper, Ehrlich and Becker (1972) looked at the interaction between market insurance and prevention activities. And as economists usually do, they classified prevention activities into two types. The first type, named self-insurance, is an *ex ante* activity (i.e. before the loss occurs), that reduces the severity of the loss should it occur. The second type, named self-protection, is also an *ex ante* activity, but one which reduces the probability of the loss. These authors showed that self-insurance and insurance are substitutes, i.e. the purchase of market insurance decreases the demand for self-insurance. Surprisingly, they derived that market insurance and self-protection could be complements.[1]

These results were pioneers in the field of *ex ante* moral hazard. The *ex ante* moral hazard problem is defined as the possibility that insurance reduces incentives to prevent the loss occurring (Shavell, 1979). But contrary to Ehrlich and Becker's work, the moral hazard problem ultimately stems from an informational asymmetry, where the insurer cannot observe some of the actions of the insured.

If market insurance premiums are actuarially fair and reflect prevention activity, the individual has an incentive to spend on prevention because it lowers the price of insurance. This is no longer the case if the price of market insurance does not reflect the individual's spending on prevention, and thus the availability of insurance may cause spending on prevention to fall, creating *ex ante* moral hazard. The price of insurance reflects individual

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[1] For a comprehensive analysis of this result, see Briys and Schlesinger (1990).

spending on prevention if insurers are able to observe those activities or if insurers are able to infer the level of prevention from the loss.

This analysis may not fully apply to health insurance. A particularity of health insurance is that it does not insure the health risk directly but only the financial consequences of the illness. In addition, health insurance only reimburses a part of the cost of the treatment. Thus, the extent of moral hazard in terms of actions that affect health may not be that large for health insurance in most instances, since the uncompensated loss of health itself is so consequential.

Ex ante moral hazard has mainly been discussed theoretically and there appear to be few empirical studies on health insurance markets (Zweifel and Manning, 2000). Actually, most of these empirical works (see Keeler and Rolph, 1988; Cherkin *et al.,* 1990 among others) look at the influence of cost-sharing on the demand for preventive care rather than *ex ante* moral hazard (the true *ex ante* moral hazard effect). They mainly show that a higher level of coverage (including both curative care and preventive care) leads to an increase in preventive care. This seems to be the case because more health coverage makes preventive care less costly and not necessarily because health insurance reduces the financial consequences of the health risk. Considering prevention activities that are not insured, such as exercising, dieting or non-smoking behaviour, allows this confusion to be avoided (see Kenkel, 2000).

In this article, we use the 2000 British Household Panel Survey (BHPS, wave 10) to test whether any evidence of *ex ante* moral hazard can be observed in the British health insurance system. In particular, based on both simple probits and an Instrumental Variable (IV) strategy, we examine whether purchasing private health insurance modifies the probability of exercising and smoking in the U.K. Indeed, private health insurance allows individuals to opt out of a subset of treatments that they obtain in the National Health Service and thus to supplement the overall level of health insurance coverage that they receive.

The structure of the paper is as follows. In section 2, we briefly present the British health care system. In section 3, we describe the variables of our model and the characteristics of our dataset. In section 4, we present our results and discuss them. Our main conclusion is the following: if we control for other variables, such as income and education, we do not find that having a supplemental private health insurance leads to a decrease in the probability of developing prevention activities.

2. Overview of the U.K. health system

The National Health Service (NHS), part of the public sector, dominates the U.K. health care market. The NHS is predominantly funded through taxation (73.5 per cent) with the remainder coming from National Insurance Contributions (20.4 per cent) and from charges such as prescription, dental and optical charges (6.1 per cent).[2] Since its inception in 1948, the NHS has provided comprehensive health care services to all U.K. residents on the basis of need and not on their ability to pay. Indeed, the level of cost-sharing is very low and amounts to 10 per cent of the price of prescription drugs.

Within the NHS, each patient has to consult first his or her general practitioner (GP) chosen inside the local community area. The GP meets the demand for basic sickness care

[2] 2002 figures.

and redirects the patient to a specialist in the case of more serious health problems. Queuing for meeting a specialist and being accepted into surgery is very frequent. NHS waiting lists are even one of the most contentious political issues in the U.K., with at any one time up to a million people awaiting NHS treatment.

There is also a parallel private health care system. Approximately 10 per cent of the population were covered by some form of private health insurance in 2002. A little over half had coverage through schemes provided by their employer, the rest being insured at their own cost or via other members of the same family. It is typical to have policies which reimburse on a fee-for-service basis. Previous evidence showed that waiting lists are a key determinant of the demand for private health insurance. In a recent paper, Besley *et al.* (1999) showed that longer waiting lists for NHS treatment are associated with greater purchases of private health insurance.

Contracting private health insurance is a way to supplement the overall level of health insurance coverage that individuals receive. Avoiding a waiting list allows individuals to have access and coverage to more care more rapidly. Thus, investigating whether contracting private health insurance causes less preventive effort addresses the *ex ante* moral hazard issue.

3. The model and data

As an indication of preventive care, we use two behavioural variables, frequency of exercising (walking, swimming and practising sport) and being a smoker. As mentioned in the introduction, the literature has generally investigated the *ex ante* moral hazard question using insured preventive treatment. For comparison we therefore also include two basic health checks for women: the propensity to undergo breast screening and cervical smears. The NHS covers those tests and purchasing private health insurance supplements their coverage. Meanwhile, no form of insurance covers exercising and smoking.

The impact on prevention of purchasing private insurance may be perceived differently depending on whether prevention is insured or not. Indeed when prevention activities are insured, it may be difficult to separate the effects of *ex ante* from *ex post* moral hazard (i.e. the change in health care consumption caused by insurance). Considering non-insured prevention activities enables one to make this separation.[3]

We use the British Household Panel Survey, wave 10 (2000/2001), which is a nationally representative sample of approximately 15,000 individuals, based on interviews with approximately 5,000 individual households. A broad range of questions are asked covering topics in household organization, the labour market, income and wealth, housing, health and socio-economic characteristics.

For the variables that bear special interest to our study, we create a dummy variable taking the value of one for all the individuals who declared to "play sport, go walking or swimming" at least once a year. We also considered inclusion of all those who answer "at least several times a year", and results are very similar.

The second behavioural variable used is whether the individual smokes cigarettes. Two additional dummy dependent variables are constructed for women. They take the value of

[3] In addition, considering prevention activities over which doctors do not have control eliminates the effect of supplier-induced demand.

one if a preventive check (respectively breast screening and cervical smear) has been conducted over the 12 months prior to the interview date.

Within the British Household Panel Survey, three categories of privately insured individuals can be considered, i.e. individuals privately insured at their own cost, individuals privately insured through their employer, and individuals privately insured through their family. These three categories differ, in decreasing order, in the perceived financial burden they bear to be privately insured.

4. Results

We give in Table 1 the different marginal effects from probit regressions of the preventive effort on the propensity to contract a private insurance and a set of typical additional explanatory variables. We included the sex and age of respondents, household income, education and subjective well-being.

The results are all compatible with the absence of *ex ante* moral hazard. In column 1 the coefficient is positive and significant for those on private insurance. This suggests that individuals with private insurance tend to practise sports activities more often. We observe also that those who have private insurance tend to be less often associated with a smoking habit (col. 2). This again indicates potential absence of *ex ante* moral hazard.

For women only, the question of prevention may also be investigated by looking at their propensity to undergo such fundamental preventive checks as cervical smears and breast screening. As indicated earlier, those tests are covered both by the NHS and by private insurers. The results in Table 1 allow us therefore to conduct a comparison of the effect of private coverage on uninsured (cols 1 and 2) and insured prevention (cols 3 and 4). The coefficient for being privately covered is just significant and positive for undergoing breast screening (at the 5 per cent level) and is not significant for cervical smears.

These results lead us to think that contracting private health insurance does not generate fewer prevention activities. One might think that this is the case because people have to pay for private health insurance and that they are more concerned with regards to the risk they face. In Table 2 we dissociate individuals who are covered at their own cost from those who are covered by their employers.

This shows indeed that the presence of *ex ante* moral hazard can be rejected on stronger grounds for individuals who pay the cost of the private insurance themselves. For insured prevention, both coefficients are insignificantly different from zero. For non-insured prevention (cols 1 and 2), it appears that having private health insurance paid at one's own expense may even lead to healthier choices.

4.1 IV estimates

These results showing little evidence of *ex ante* moral hazard associated with better health coverage may come from underlying unobserved variables that may explain both the decision to enter private insurance and the dependent variables used in the analysis.

One candidate for this unobserved variable is risk aversion (see Kenkel, 2000). More risk averse individuals may be more likely both to buy insurance and to invest in prevention. If this is the case, then our regression estimates are affected by a traditional "omitted variable bias". This section discusses estimates of the effect of private coverage using an Instrumental Variable (IV) strategy. The essence of this identification strategy is to find a variable highly correlated with the propensity to insure privately but uncorrelated with the

Table 1:
Marginal effect based on probit estimates: prevention and choice of private health insurance coverage

	Walking, swimming and practising a sport (1)	**Smoking (2)**	**Breast screening (3)**	**Cervical smear (4)**
Privately insured	0.051	−0.060	0.030	0.015
	(0.010)**	(0.011)**	(0.015)*	(0.010)
Female	−0.019	−0.029	n.a.	n.a.
	(0.007)**	(0.007)**		
Age	−0.005	−0.006	−0.005	0.003
	(0.001)**	(0.001)**	(0.001)**	(0.001)**
Education:				
Degree	0.141	−0.169	0.108	0.015
	(0.009)**	(0.010)**	(0.020)**	(0.014)
A level (17–18 years old	0.110	−0.107	0.054	0.015
	(0.008)**	(0.009)**	(0.013)**	(0.009)
O level (15–16 years old)	0.077	−0.070	0.024	0.006
	(0.009)**	(0.010)**	(0.015)	(0.010)
Subjective well-being	−0.015	0.010	0.004	0.002
	(0.001)**	(0.001)**	(0.001)**	(0.001)
HH income in 2nd quintile	0.016	−0.021	0.051	0.050
	(0.011)	(0.013)	(0.017)**	(0.013)**
HH income in 3rd quintile	0.035	−0.025	0.064	0.066
	(0.011)**	(0.013)	(0.017)**	(0.015)**
HH income in 4th quintile	0.030	−0.072	0.047	0.059
	(0.012)**	(0.013)**	(0.018)**	(0.015)**
HH income in 5th quintile	0.063	−0.089	0.068	0.073
	(0.012)**	(0.013)**	(0.019)**	(0.016)**
N	14769	14769	8054	8054

Note: Robust standard errors in parenthesis using White (1980) correction, adjusted for clustering at the household level, Coefficient significant at 5 per cent level are depicted with * and those significant at 1 per cent level with **. The reference for the education variables is no qualification. Subjective well-being is measured on a 12-point scale, with 12 for maximum well-being, HH income are household income dummies for position in the quintiles of the income distribution, in increasing order (the poorest being the reference left-out category).

error term. The intent is to approximate a randomized trial using the exogenous variation provided by the instruments (Angrist and Krueger, 1999).

The choice of instruments originates from previous evidence in the U.K. showing that the demand for private coverage is associated with support for the Conservative Party (see Besley *et al.,* 1998). The same authors used also occupations of workers as instruments for private coverage. We investigated similar instruments for the probability of being covered

Table 2:
Marginal effect based on probit estimates: prevention and type of health insurance coverage

	Walking, swimming and practising a sport (1)	**Smoking (2)**	**Breast screening (3)**	**Cervical smear (4)**
A. Private insurance paid by employers				
Private coverage	0.016	−0.037	0.048	−0.025
	(0.018)	(0.017)*	(0.031)	(0.018)
B. Private insurance at own cost only				
Private coverage	0.054	−0.062	0.031	0.031
	(0.013)**	(0.016)**	(0.024)	(0.017)

Note: The variables of control and the samples are as in Table 1. Standard errors are corrected as in Table 1.

by a private insurance. We report in Table 3 the estimates of these first stage regressions together with F-statistics on their (joint) significance for different specifications.

The identification strategy is to find variables that are highly correlated with the propensity to insure privately but that are unrelated to risk aversion. In Table 3 we find more evidence that party support is significantly related to the tendency to take a supplementary private insurance (see Besley *et al.,* 1998). We also observe that support for Labour is very significantly and negatively associated with the propensity to go private. In our sample, 50 per cent of the individuals are employees only. It is unlikely that individuals choose a job because the contract offers also a private insurance. Hence, we may assume that being an

Table 3:
First stage probit estimates

Instruments	**(1)**	**(2)**	**(3)**	**(4)**
Support Conservatives	0.342	0.348		
	(0.035)**	(0.034)**		
Support Labour			−0.139	−0.145
			(0.031)**	(0.031)**
Employee		0.164		0.155
		(0.032)**		(0.032)**
F-statistic for excluded instruments	43.25	62.46	9.58	22.02

Note: The reported F-statistics are tests of the (joint) significance of the excluded instrument(s). The propensity to be privately covered (individually and through employer and family) is regressed on the instrument(s) and the same variables as in Table 1.

employee covered by a private insurance (work paid) is not correlated with individual risk aversion. We also assume that Conservative support and Labour support are unrelated to risk aversion.

In Table 4, we show estimates using IV regressions of our two behavioural preventive variables. This second step replaces the dummy variable (0,1) for being privately insured by the predicted probit values derived from the first stage.

The propensity to be privately insured is instrumented by two different sets of variables: Conservative support and employee on the one hand, and Labour support and employee on the other hand. We only show the estimates for the (instrumented) propensity to be privately covered.

Table 4:
IV estimates

	Dependent variable: Walking, swimming and practising a sport		**Dependent variable: Smoking**	
Instruments	**Estimates (1)**	**Hansen's J-statistic (P-value) (2)**	**Estimates (3)**	**Hansen's J-statistic (P-value) (4)**
Conservative support and employee	0.345 (0.091)**	0.50	−0.158 (0.103)**	0.001
Labour support and employee	0.216 (0.171)	0.93	0.664 (0.221)**	0.001

Note: All models include also the same variables as in Table 1. Robust standard errors are reported in parenthesis, adjusted for cluster at the household level (White, 1980). The coefficients reported are the estimates of the instrumented propensity to be privately insured. Hansen's J-statistic is consistent in the presence of intra-cluster correlation (Baum *et al*., 2003; Hoxby and Paserman, 1998).

P-values for the Hansen's J-statistic (Hansen, 1982) indicate acceptance of the over-identifying restriction in the case of "walking, swimming and practising a sport". We have to reject the null hypothesis that the excluded instruments are exogenous in the case of smoking. We therefore fail to find valid instruments for the propensity to be privately insured in that latter case. So restricting our comments to column 1, we find again that the propensity to be privately insured positively affects the tendency "to walk, swim and practise sport" when using "Conservative support" and "being an employee" as instruments. When we use "Labour support" and "being an employee" as instruments, the estimate is no more significant. Using a IV strategy leads us therefore to confirm that *ex ante* moral hazard is not observed within our data. Actually, we even bring some support for a new story where being privately covered even causes the individuals to produce more non-insured preventive activities like walking, swimming and practising sport.

5. Concluding remarks

In this paper, we investigate how different health insurance plans impact on preventive behaviours in the U.K. Based on our data, we do not find any evidence of *ex ante* moral hazard. Using an IV strategy, we control for the effects of unobservable heterogeneity in factors that jointly determine health insurance and health behaviour, such as risk aversion.

It may be the case that paying to be insured rather than being insured only makes individuals more concerned about the risk they face. This particular issue would require further investigations.

Generally our results suggest that a health care market with widespread insurance coverage may lead to more (rather than less) prevention compared to a market where coverage is low. The potentially important policy implications of these findings call for a deeper analysis. In future work, we intend to use the panel property of the BHPS in order to check whether our results still hold over a longer period of observation.

Appendix

Descriptive statistics

	Means	**Standard error**
Dependent variables:		
Walking, swimming and practising a sport at least once a year	0.768	0.422
Being a smoker	0.282	0.450
Privately insured, individually and through family	0.150	0.357
Privately insured individually and through work	0.106	0.308
Privately insured at own cost	0.058	0.234
Independent variables:		
Female	0.545	0.498
Age	45.458	18.478
No qualifications	0.342	0.474
O level (15-16 years old)	0.187	0.390
A level (17-18 years old)	0.356	0.479
Degree	0.115	0.319
Household income	2286.328	1721.126
Individual well-being [1-12]	1.941	3.001
Instruments:		
Voted Conservative at previous national election	0.205	0.404
Voted Labour at previous national election	0.339	0.474
Being an employee	0.511	0.500

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