Prior Conditions, Age and the Impact of Insurance

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Abstract

Health insurance coverage reduces the price perceived by the insured and consequently increases the quantity of health care demanded. We consider vision care insurance because this provides a unique opportunity to observe the differential response to insurance coverage by those with and without a prior medical condition. The results show that there is a response by both groups and the response is larger for those with a prior condition. We also find that vision care insurance is poorly matched in time to the patterns of vision care needs.

JEL: I10, I12, health insurance, vision care, prior conditions

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1. Introduction[1]

Canada's Public Health Insurance does not cover the cost of regular vision care[2]. To fill the void, vision care insurance is widely offered in Canada as a fringe benefit to employees. About one-half of adult Canadians are covered by private vision care insurance. Vision care insurance usually covers the services of optometrists (or equivalent) who examine eyes, prescribe corrective lens and look for diseases of the eye. If serious eye diseases are present, the patient may be sent to a medical doctor and their services will be covered by the public system. The insurance may also cover the costs of filling prescriptions for lens and of purchasing frames.

To the best of our knowledge, we know of no Canadian studies of vision care insurance and almost no studies in other countries. Evidence about Vision Care insurance in the United States is available in Coleman et. al.(2004) and Jain(1988)[3].

Health insurance may have a large impact on health care usage. Insured individuals perceive that the price for usage is reduced by the insurance and consequently they expand their use of medical resources. Vision Care insurance has several interesting aspects that distinguish it from most other kinds of health insurance. First, the insured population can be divided into two easily identifiable groups with very different probabilities of an insurance claim. In our data, individuals with glasses are much more likely to visit an eye doctor. For adults under fifty, individuals with glasses are two to three times more likely to visit an eye doctor than individuals

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[1] We would like to thank Ali Iglesias for her excellent research assistance.

[2] The Public Health system covers the costs of treatment in Hospitals and by Doctors. Limited Vision Care is provided by some provinces and this is discussed in the data section.

[3] Jain (1988) documents the extent of vision care insurance coverage as an employee benefit in the US but does not analyze its impact. Coleman et al. (2004) investigates a very specialized change in the benefits provided under managed care. The focus is narrow.

without glasses. This differential declines with age. The cost of vision care insurance does not depend on whether one has glasses. Consequently, there is a subsidy from those without glasses to those with glasses embedded in the group insurance policy.

Second, the benefits of the insurance must be small. Individuals benefit from insurance by shifting risks to the insurance company. Eye care insurance claims are capped at very low dollar amounts. This implies that the value of risk shifting cannot be large. Third, there are many small claims. Administration costs must be relatively high which reduces the size of any positive net benefits to individuals and society.

Eyes deteriorate with age but insurance coverage also declines with age. Because vision care insurance is an employment benefit many individuals lose this coverage when they retire. The matching over age between the demand for eye care and insurance coverage is poor.

Our paper examines the determinants of the demand for vision care. In particular, we are interested in the impact of insurance on the demand for eye care. Insurance may have very little impact on eye care usage. Since eye care is relatively cheap, the insurance-induced reduction in price may not influence the decision to use eye care. The classic moral hazard argument would suggest that the presence of insurance coverage may be endogenous. Individuals with private information about their demand for vision care may seek to acquire insurance. We account and test for the endogeneity of vision care insurance in our analysis. Also of particular interest is the influence of prior conditions. Our data allows us to observe and compare the response to

insurance coverage by those with and without glasses. We know of no other study that considers this aspect[4].

We find a very large effect of prior conditions on the use of eye care resources after we control for other influences. Those without glasses subsidize those with glasses given the common premium structure. Those with prior conditions are more than twice as likely to visit an eye doctor. Although the benefits of insurance are small, insurance increases the likelihood of an eye care visit by twenty to twenty-five percent. The impact of insurance is much larger for those with a prior condition. In both cases insurance raises the likelihood of a visit and the increase is larger for those with a prior condition. Our hypothesis that insurance will have a smaller impact on those with prior conditions is false.

In the next section, we will describe the age related patterns of insurance coverage, eye care resource usage and prior conditions for males and females. This is followed by the empirical models and their estimates. The final section offers some conclusions.

2. Data – Descriptive Statistics

The Canadian data are taken from the public use file of the 1996-97 and 1998-99 National Population Health (NPH) Survey. The NPH surveys are large scale surveys that interview individuals across Canada. The questionnaire covers a wide range of health information and is the only general Canadian health survey that covers the whole country. Since 1994, Statistics Canada, Canada's National Statistical Agency, has completed six national health

[4] In a recent paper on obesity, Bhattacharya and Sood (2005) estimate the externality from group insurance contracts that charge an identical premium to those who are obese and those who are not. In any given contract period,

surveys. There were three Canadian Population Health Surveys in the 1990's but only two has the appropriate insurance information in the public use file.[5] The other NPH surveys were in 1994-5. Insurance questions were asked in 1994-5 but only aggregate insurance information is contained in the public use file. Our data covers individuals who are twenty or older. Individuals are asked if they visited an eye doctor in the last year and if yes then how many times.

2.1 - Incidence of Vision Care Insurance

The data contains information that an individual has vision care insurance. However, there are no details about the insurance contract. Most group insurance contracts have low level caps, perhaps $150, over a specified time period, often two years. Figure 1 shows the proportions of Canadians with vision care insurance by age. In the late 1990's, about forty percent of individuals in their early twenties were insured. The fraction of young females with insurance is slightly higher than for males. The total insured proportion rises slowly until by age forty almost sixty percent of the population are covered. The wedge between the proportions of male and female with insurance persist up to the age of forty. After the age of forty, the proportions of males and females with insurance begin to decline. The decline in insurance coverage for females between the age of forty and late sixties begins earlier and is slower than for males. Around the age of sixty, the proportion of men with insurance declines steeply.

Vision care insurance is a fringe benefit associated with employment. After age 55, as individuals retire, the proportion of individuals with coverage declines to about thirty five

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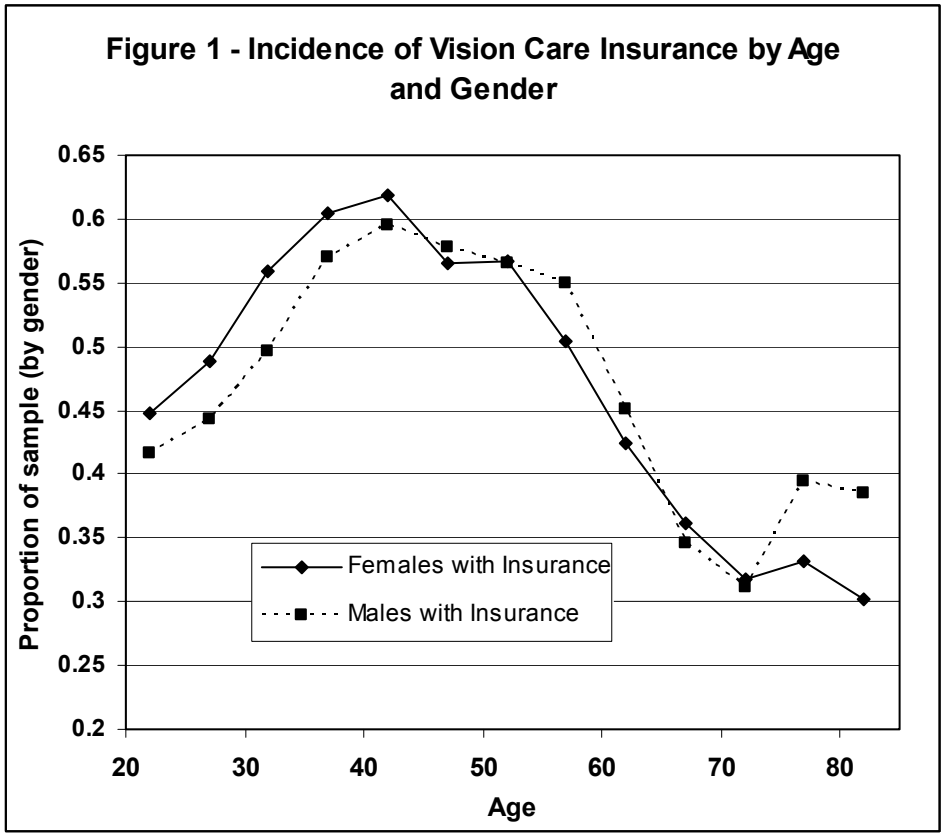
obesity is predominantly an exogenous prior condition. Their paper treats obesity as endogenous and does not focus on the differential responses to insurance by those with and without their prior condition, obesity.

percent by age 67. The decrease at 65 is larger for males than females with insurance. Those with continuing insurance are typically receiving the insurance coverage as a retirement benefit from their former employer[6].

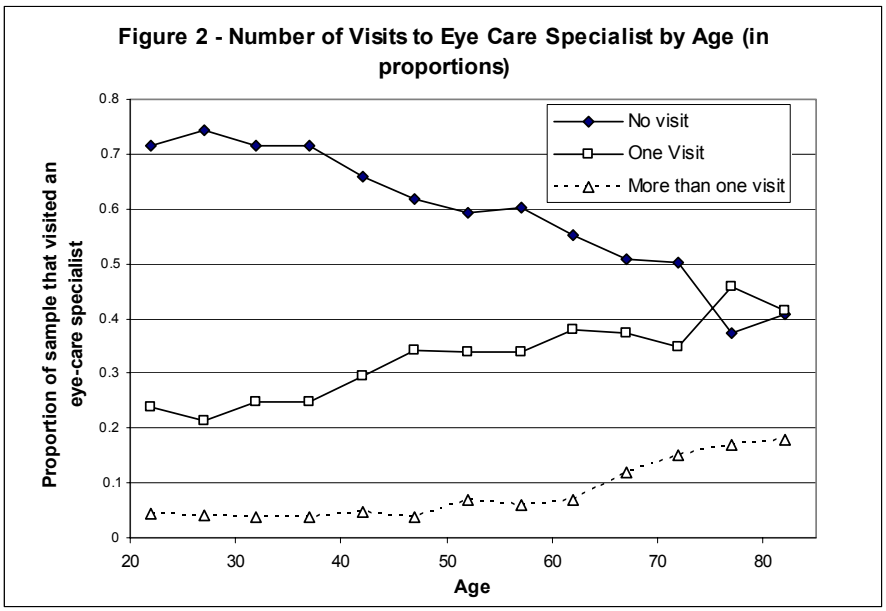


It is very unlikely that insurance is chosen by the individual. Typically this is a fringe benefit with no options. Serious medical problems with vision are covered by the public system. The private vision care insurance covers the cost of lens and frames with a fixed dollar limit over a one or two year period. In the next section, we consider the use of eye-care resources by age. Usage rises with age as vision deteriorates although the rate of deterioration is not constant.

[5] Recently the NPH survey has been replaced by the Canadian Community Health Survey which does not contain

2.2 - Using Eye Care Resources

Figure 2 tabulates the proportion of individuals at each age that makes one or more visits a year to an eye-care specialist in the pooled sample. Between the ages of twenty to forty about one-quarter of the individuals visited an eye doctor. This proportion rises quite quickly to thirty-five percent for individuals in their early forties. The proportion remains at this level until individuals reach their late seventies when it rises by another ten percent. Very few individuals visit the eye doctor more than once in a year. The proportion remains around five percent from ages twenty to mid-sixties. After around sixty-five, there is a steady increase until about 18 percent of eighty year olds visit the doctor more than once a year.



the same insurance information

[6]Retired individuals can buy vision care insurance but relatively few do.

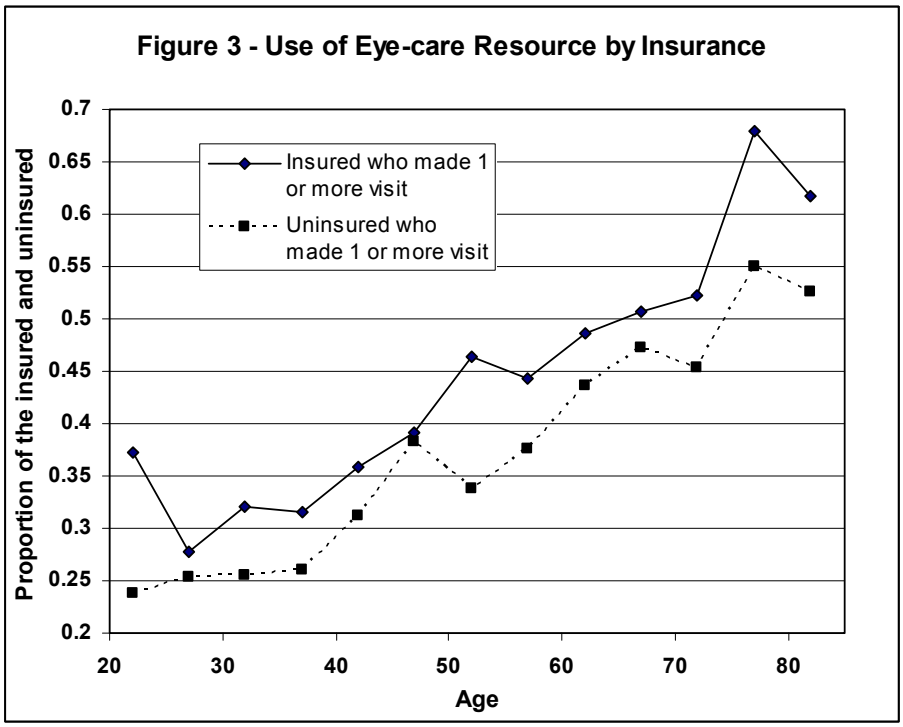


Figure 3 graphs the use of eye-care resources by age and insurance coverage. As individuals age, their eye sight declines and a larger proportion visit the eye doctor. Since eye-care is relatively inexpensive, those without insurance also steadily use more resources with age. However, insurance always increases the use of resources.

2.3 - Prior Condition and Vision Care Insurance

The data allow us to identify individuals with vision problems. It is rare to have evidence on an insurance contract offered to groups in which individuals with a high probability of a claim can be very easily identified. The RAND experiment investigated whether those who were in

poor health responded differently to price changes than those who were healthy. They found, Manning (1987), no differential response to insurance based on health status.

Individuals can be classified either as having no vision problems, vision problem that can be corrected using lenses and vision problem that cannot be corrected by vision lenses. About 54 percent of Canadians wears some form of corrective lenses, while only 2.4 percent suffers from more severe vision problems that cannot be corrected by vision lenses.

Figure 4 graphs the proportion of the sample with vision problem by age. Before the age of twenty about thirty percent of the population has been diagnosed with eye problems that can be improved with glasses. For the next twenty years, there are few new diagnoses. Starting at age forty, there is a rapid increase in the proportion of individuals with glasses. The proportion doubles between age forty and fifty-five when about three-quarters of the individuals wear glasses.

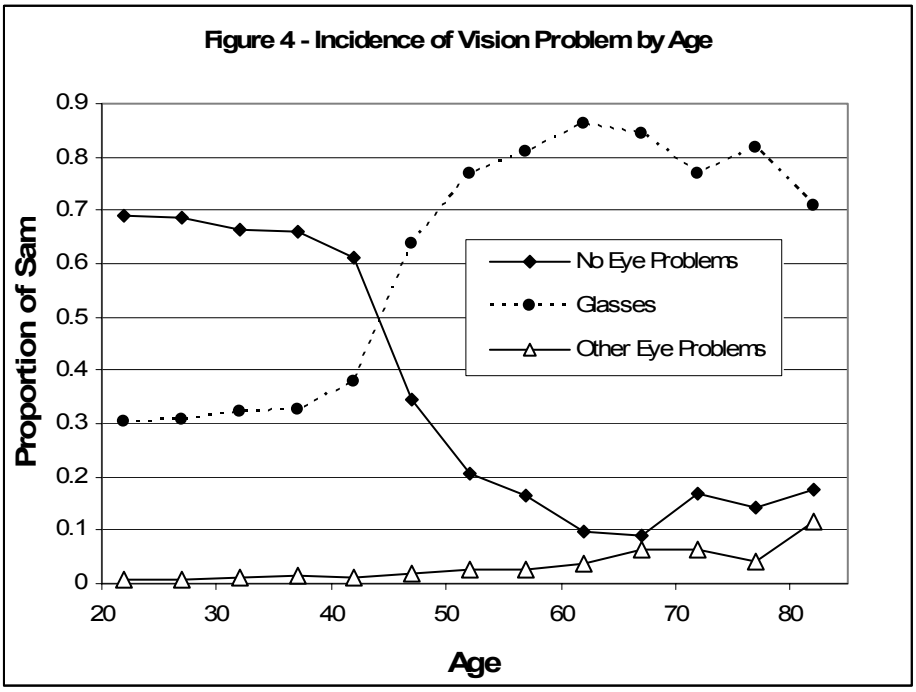


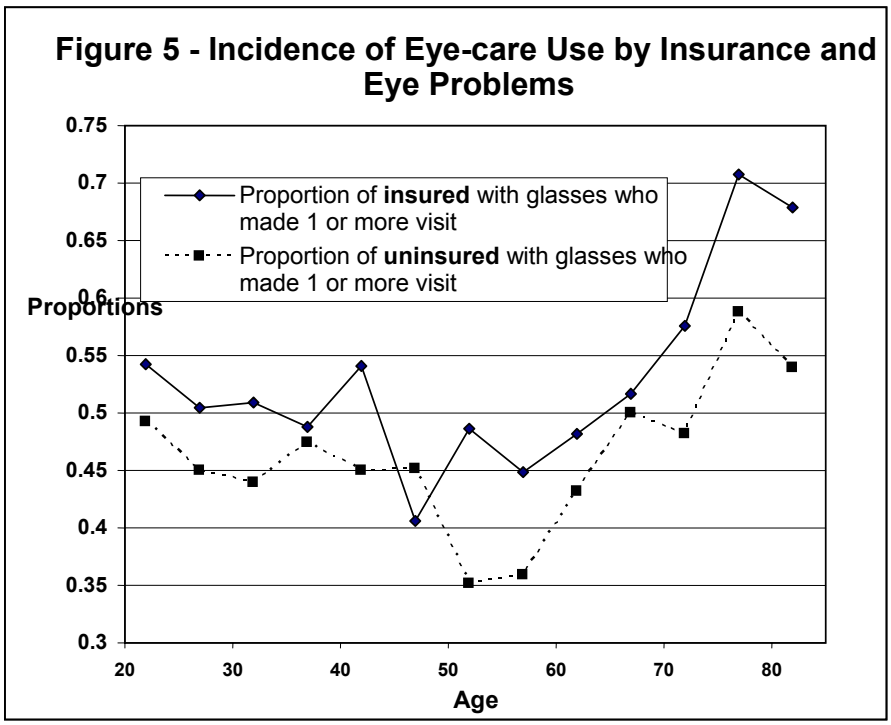
Figure 4 also shows that individuals with severe eye-problems accounts for a small fraction of the sample. Before the age of 60, this generally accounts for less than 3 percent of the sample. The very distinct pattern in Figure 4 requires some comment that relate to the data and the possible endogeneity of the prior condition. Prior to age 40, the percentage of individuals who have glasses is almost constant. Consequently, individuals are not going to the eye doctor to acquire glasses and endogeneity is not a major possibility. The same argument holds for individuals older than 57. In this range the proportion with glasses is roughly constant.

Acquiring glasses usually occurs either prior to age 20 or between the ages of 40 and 55. In the latter age range, many individuals are using non-prescription reading glasses for the first time. These do not require a visit to an eye doctor. Unfortunately our data do not allow us to separate those who use non-prescription reading glasses from those who use other types of glasses that do require a prescription lens. Between age 40 and 57, eye care visits do not rise sharply to match the sharp rise in the use of glasses.

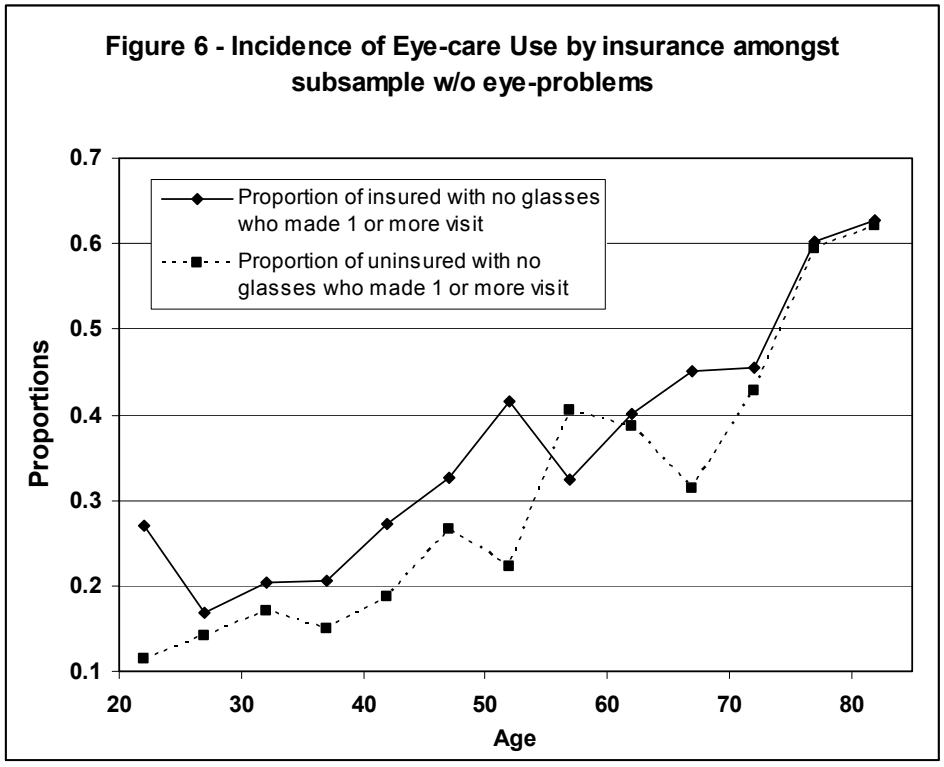
It would be useful to test more formally for the endogeneity of our prior condition. Unfortunately we do not have any reasonable instruments. Our results are not very different if we restrict our age range to before 40 and after 57. If endogeneity is a problem it would be for those individuals between 40 and 57 years of age.

It is usually recommended that individuals with glasses visit an eye doctor about once every two years. Consequently, it is not surprising that about one half of those with glasses visit an eye doctor every year. Does insurance coverage make a difference in whether they visit? The answer is yes as we show in Figure 5. The figure shows the proportion of individuals with glasses who visit an eye doctor separately for those with and without insurance. Insurance

coverage increases the likelihood of a visit by an average of ten percent although there is considerable variation at different ages.



A priori, it is more likely that insurance coverage will have a larger effect on visits for those without glasses. The latter do not have a prior condition that might lead them to visit the eye doctor. Their sensitivity to a price reduction should be larger. This is shown in Figure 6. For individuals under fifty, there is a thirty to forty percent increase in the proportion who visit an eye doctor when they are insured.



3. Empirical Model

The empirical results are based on estimates of the determinants of the demand for vision care. Beginning with the Rand HIS study, Manning et al. (1987), it has been common to study the demand for medical care by estimating equations for the demand for any visits[7]. We know if an individual visited an eye doctor within the past year and how many times such visits were made[8].

Insurance coverage will raise the amount of eye care used. The individual will perceive eye care as inexpensive even though this is socially inefficient. Will the effect be very small or

[7] More discussion can be found in Mueller and Monheit(1988) and Martin et. al. (2005).
[8] Since very few individuals made more than one visit, these results are not included.

non-existent with eye care insurance? Almost all health care usage increases with income and with education which are included in our model. Eye sight deteriorates with age and this may lead to greater eye care usage.

A number of control variables are included. Gender, marital status and location may influence the use of eye care. Location is measured by both a rural dummy and a Provincial dummy. We begin with the following Linear Probability Model (LPM) and Probit regression,

$$\begin{aligned} \text{Visit}^*_i \quad &= \beta_0 + \beta_1 \text{Insur}_i + \beta_2 \ln(\text{income}_i) + \beta_3 \text{PostHS}_i + \beta_4 \text{College}_i + \beta_5 \text{Age}_i + \beta_6 \text{Age}^2_i \\ &+ \beta_7 \text{Glasses}_i + \beta_8 \text{Male}_i + \beta_9 \text{Married}_i + \delta_P D_{Pi} + \delta_{98} D_{1998i} + \varepsilon_i . \end{aligned} \qquad \text{(Equation 1)}$$

The definitions of the variables are given in Table 1 below. The omitted education level is less than high school, LessHS. The variable D_{Pi} denotes provincial dummy variables and D_{1998i} is a dummy variable for the year 1998-99. The omitted provincial dummy variable is that for Ontario. These provincial fixed effects have several roles. The prices for eye care services may vary by Province. The second and main aspect is to capture some differences in Provincial health care policy. For example, Ontario covers the cost of eye examinations for individuals between 18 and 64 under the Provinces public insurance program. No other Province offers this coverage. Some Provinces, including Ontario, also offer some coverage of eye care costs for seniors. We expect that eye care visits will be much lower in all the other Provinces relative to Ontario.

Table 1 – Definition of Variables

Age	The survey record age in five year intervals. The mid-point of the interval is assigned to this variable.
Age2	The variable Age squared.
Male	Indicator for male respondent.
LessHS	Dummy Variable to indicate that respondent did not complete High School
PostHS	Dummy Variable to indicate that respondent completed High School
College	Dummy Variable to indicate that respondent has college education or higher.
Income	Variable measure household income
Married	Indicator for married individuals. Individuals who are single, divorced or widowed are recorded as not married.
Glasses	Indicator for individuals with vision problems. Almost all the respondents with vision problems fall into the category of having the problems corrected with glasses or contacts. There are a very small number of cases of other vision problems.
Visit	Dummy variable that takes a value 1 if the respondent pays a t least one visit to an eye-care specialist.
Insur	Dummy Variable to indicate respondent has eye-care insurance.

Table 2 shows the results from two specifications of the Probit and Linear Probability Model (LPM) regression given in Equation 1[9]. We consider the LPM regression to provide a benchmark for comparison when we later instrument for the endogeneity of vision care insurance. This regression allows us to identify covariates that are significantly correlated with the decision to visit an eye-care specialist. The qualitative results from both specifications and both estimation methods are very similar. Individuals with insurance are more likely to visit the eye doctor and the estimated effect is significant. Even with this odd form of insurance lowering the price of medical care generates extra usage. The other major determinant of visits to the eye

[9] All regressions include dummies for the Provinces. These are excluded from the Tables.

doctor is the presence of prior eye problems as measured by the variable 'Glasses'. This effect is significant and positive.

Higher income and education does lead to a higher likelihood of making a visit. Individuals with educational attainment of high school and above are on average more likely to make a visit (relative to individuals with less than high school education). This is consistent with the importance of education levels in increasing the use of most forms of medical care. For eye care, it is likely that those with more education use their eyes for reading more intensively.

The estimates in Table 2 suggest a significant positive age and gender effect. The significant estimate on 'Male' in all 4 regressions suggests that the average likelihood of a visit is significantly lower for males relative to females. The profile by age is also non-linear as suggested by the significant estimates on 'Age' and 'Age2'. The second specification in PM2 and LM2 allows for the interactions of prior condition and age.

The results in Table 2 and the earlier descriptive statistics provide strong evidence that females use more vision care than males. Our estimates also suggest that more education, prior condition of wearing glasses and having vision insurance were the most important influences on the decision to visit an eye doctor. Income and being married are also significant predictors of usage. This suggests that there is a fashion aspect of wearing glasses that is more important when one is single. As expected vision care usage increases with age as age related vision problems become more prevalent.

We also explored the importance of gender differences in vision care usage further by interacting it with various variables. Numerous specifications were attempted.

Table 2 Probit and LPM Estimates

(Dep variable – Indicator for visit to eye-specialist)

	Probit regression		Linear Probability Model	
Specification	**PM1**	**PM2**	**LM1**	**LM2**
Insurance	0.1555** (0.0110)	0.1501** (0.0111)	0.0533** (0.0073)	0.0513** (0.0073)
Glasses	0.6489** (0.0110)	2.0990** (0.0950)	0.2319** (0.0077)	0.7126** (0.0624)
Age	-0.0135** (0.0020)	0.0122** (0.0031)	-0.0057** (0.0013)	0.0020 (0.0018)
Age^2	0.0002** (2.13E-05)	2.13E-05 (3.14E-05)	9.99E-05** (1.32E-05)	2.47E-05 (1.95E-05)
Male	-0.1276** (0.0103)	-0.1256** (0.0104)	-0.0435** (0.0069)	-0.0425** (0.0069)
Glasses x Age		-0.0538** (0.0040)		-0.0182** (0.0027)
Glasses x Age^2		4.40E-04** (3.95E-5)		1.531E-04** (2.64E-05)
Married	-0.0600** (0.0113)	-0.0406** (0.0115)	-0.0193** (0.0075)	-0.0142* (0.0076)
1998 Dummy |	-0.0105 (0.0104)	-0.0084 (0.0104)	-0.0036 (0.0067)	-0.0029 (0.0067)
Post HS	0.1121** (0.0129)	0.1183** (0.0129)	0.0379** (0.0082)	0.0395** (0.0082)
College	0.1945** (0.0135)	0.1923** (0.0135)	0.0666** (0.0092)	0.0650** (0.0092)
Ln(income)	0.0899** (0.0086)	0.0806** (0.0086)	0.0298** (0.0058)	0.0273** (0.0058)
Constants	-1.5811** (0.0956)	-2.1595** (0.1095)	-0.0181 (0.0640)	-0.1891** (0.0707)
Pseudo R^2 / R^2	0.0767	0.0805	0.0967	0.1006

The symbols ** and * denotes significance at the 5 percent and the 10 percent respectively. No. of obs=67017, standard error in parenthesis

The parameter estimates from these specifications are generally insignificant and we have chosen to omit these results. Our results nonetheless suggest that there is a significant difference in the likelihood of males and females using eye care resources. However, the difference is not closely associated with the major variables that determine whether each gender will visit the eye doctor.

To quantify the magnitude of these estimates, Table 3, below, tabulates the marginal effects from the specifications PM1 and LM1. These marginal effects are evaluated for a single 25 and 45 year old female living in Ontario with annual income of $40,000. The second and fourth columns of Table 3 use the estimates from PM1 while the third and fifth column does the same using the estimates from specification LM1. The first and second row considers the marginal effects from having eye-care insurance and eye-problem respectively. Eye-care insurance appears to raise the probability of a visit by around 22 to 25 percent.

Table 3 Marginal effects (change in probabilities) using specification PM1 and LM1

(% change in parenthesis)

Variables	**Single Female (25 years old)**		**Single Female (45 years old)**	
Specifications	PM1	LM1	PM1	LM1
Insurance	0.0466 (0.2302)	0.0533 (0.2577)	0.0484 (0.2226)	0.0533 (0.2444)
Glasses	0.2246 (1.1088)	0.2319 (1.1212)	0.2301 (1.0578)	0.2319 (1.0631)
Male	-0.0341 (-0.1682)	-0.0434 (-0.2100)	-0.0356 (-0.1639)	-0.0434 (-0.1992)

These results for insurance can not be compared to estimates from other research on vision care insurance. There are results for dental insurance which has some similar features. Our estimates are in the same range as those found by Manning (1987) and Mueller and Monheit (1988) for dental insurance

The marginal effect from having vision problem is much larger in magnitude. The estimates suggest that having vision problem on average double the annual likelihood of a visit. The third row considers the difference across gender. A similarly aged single male individual earning the same income would on average be around 16 to 20 percent less likely to visit an eye specialist.

Since premiums do not depend on the prior condition, there is a clear transfer from (or subsidy of) those without glasses to those with glasses. This would not be feasible if individuals were buying separately but the group purchase allows this to be sustained.

The very large impact of the prior condition was shown in Table Two. In this section, we consider a different question. Our hypothesis is that the existence of the prior condition will weaken the impact of the other important determinants of going to see the eye doctor. For example, males are more reluctant than females to visit an eye doctor. We expect that males with glasses will be less reluctant to visit the eye doctor than males without glasses. Being insured should be important independent of whether an individual has glasses. However, those without glasses should be more sensitive to being insured than those with glasses. The intuitive idea is that individuals with glasses are going to see the eye doctor mainly because they have glasses. Other variables, such as insurance or gender may alter their choices but not by as much as they do for individuals without glasses.

There are two alternative hypotheses. First, there may be no difference in the impact of insurance and other variables for individuals with and without the prior condition. Second, the prior condition is so powerful that there is no impact from being insured on the decision to visit the eye doctor. We investigate these effects by interacting prior conditions with age, education and insurance. The results are shown in Table 4.

Table 4 - Probit and LPM Estimates
allowing for interaction with prior conditions

(Dep variable – Indicator for visit to eye-specialist)

	Probit regression		**Linear Probability Model**	
Specification	**PM3**		**LM3**	
Variables	**Coefficient**	**Std. Error**	**Coefficient**	**Std. Error**
Insurance	0.1156**	(0.0161)	0.0310**	(0.0095)
Glasses	2.1880**	(0.0977)	0.7230**	(0.0632)
Age	0.0129**	(0.0031)	0.0024	(0.0019)
Age^2	2.08E-05	(3.16E-05)	2.18E-05	(1.96E-5)
Male	-0.1250**	(0.0104)	-0.0426**	(0.0069)
Glasses*Age	-0.0553**	(0.0041)	-0.0190**	(0.0027)
Glasses *Age^2	4.44E-04**	(3.98E-05)	1.60E-04**	(2.65E-05)
Insurance*Glasses	0.0631**	(0.0210)	0.0406**	(0.0139)
PostHS*Glasses	-0.0639**	(0.0259)	-0.0075	(0.0164)
College*Glasses	-0.1540**	(0.0267)	-0.0299*	(0.0180)
Married	-0.0440**	(0.0115)	-0.0149**	(0.0076)
1998 Dummy	-0.0093	(0.0104)	-0.0030	(0.0067)
PostHS	0.1550**	(0.0195)	0.0434**	(0.0106)
College	0.2787**	(0.0202)	0.0800**	(0.0121)
Ln(income)	0.0825**	(0.0086)	0.0277**	(0.0058)
Constant	-2.2233**	(0.1107)	-0.1975	(0.0707)
Pseudo R^2 / R^2	0.0810		0.1012	

The symbols ** and * denotes significance at the 5 percent and the 10 percent respectively, No. of obs is 67017, Standard error in parenthesis

The interaction of prior conditions and insurance is significant suggesting that usage by those with glasses respond more strongly to insurance. In contrast, the prior condition does reduce the impact of age which is not surprising. Individuals without glasses become more likely to visit the eye doctor as they age. Prior condition also significantly reduces the differential likelihood of those with college education visiting an eye doctor. However, this result does not hold for the more general framework discussed below. We have recalculated the marginal impacts in Table 5.

Table 5 again considers the marginal effect of prior condition and insurance for a single female living in Ontario using the results of specification LM3 and PM3 reported in Table 4. These latter specifications allow for more complicated interaction between age, priori condition and insurance coverage. The qualitative results from the linear probability model and the probit regression are very similar. Comparing the results reported in Table 3, the effect of insurance coverage on the likelihood of an annual visit by a single female without glasses is more modest.

The increase in probability is highest for a 25 year old at around 17 percent and it decreases to around 11 percent for a 65 year old female. Prior condition has a much larger effect that previously reported in Table 3. For a 25 year old female, wearing glasses on average increases the probability of a visit by almost 2.9 times. This likelihood decreases sharply with age. The joint effect of prior condition and insurance is even larger. The probit estimates suggest that the likelihood of a visit is increased by around 3.2 times for a 25 year old female. This change decreases by more than half when the female reaches the age of 45 The results from Table 5 further highlight importance of both prior condition and insurance in affecting the annual likelihood of a visit to an eye care specialist.

Table 5 Marginal effects (changes in probability) from PM3 and LM3 (% change in parenthesis)			
	a) Using Probit Estimates PM3		
	25 years old	45 years old	65 years old
Insurance	0.0332 (0.1724)	0.0402 (0.1433)	0.0450 (0.1153)
Glasses	0.3669 (1.9053)	0.2000 (0.7135)	0.1588 (0.4069)
Glasses and Insurance	0.4361 (2.2647)	0.2712 (0.9673)	0.2284 (0.5853)
	b) Using Linear Probability Model LM3		
Insurance	0.0310 (0.1478)	0.0310 (0.1075)	0.0310 (0.0806)
Glasses	0.3396 (1.6185)	0.1826 (0.6328)	0.1532 (0.3982)
Glasses and Insurance	0.4113 (1.9599)	0.2542 (0.8811)	0.2248 (0.5845)

As mentioned in the introduction, the presence of eye-care insurance could be endogenous. Individuals with private information about their own demand for vision care would have an incentive to acquire this form of insurance. That is, there may be factors unobserved to the econometrician that is correlated with the decision to acquire insurance coverage. This would lead to the a bias in our parameter estimates. We instrument for the endogeneity of the insurance variable using information on the individual self reported health utility index (HUI) and occupation. In the situation where an individual is of poor average health and expects to demand a lot of health care like vision care, the HUI variable would act as a proxy for the unobserved

health state. Occupational dummy would act as a good instrument since it is unlikely that individuals would target certain occupations in order to acquire insurance coverage. There is much empirical evidence to suggest that eye-care insurance is part of an employment benefit package. Since accounting for the endogeneity of a binary variable in the context of a probit regression is computationally demanding and difficult, we choose the more robust and simpler 2SLS approach of accounting for the endogeneity. The results of the 2SLS estimates for specification LM2 and LM3 are given in Table 6.

The qualitative result from the 2SLS regressions are very similar to the results reported in Table 4 and 2. The notable difference is that the coefficient on ln(income) and the interaction of prior condition and glasses and education in specifications LM2 and LM3 are no longer significant. In the second last row of table 6, we report the test statistic on the residuals of the regression based Hausman test for endogeneity. A significant test statistic would leads to conclude that Insurance coverage is endogenous. In specification LM2, we reject the null at the 10 percent level while LM3, we fail to reject the null. The results from these test seems to suggest that the endogeneity of insurance coverage is likely to be not a problem once we have a flexible specification for the probability of a visit.

More robustness checks

We extend our results by studying three sub-samples to test if the coefficients of our major variables are the same in these samples. The sub-samples are gender, prior conditions and insurance. These allow more flexibility in the parameter results than those in Tables 2 and 4. The results which are not be given are available on request.

Table 6 -2SLS Estimates
accounting for the endogeneity of Insurance

(Dep variable – Indicator for visit to eye-specialist)

Specification	**LM2**		**LM3**	
Variables	**Coefficient**	**Std. Error**	**Coefficient**	**Std. Error**
Insurance	0.1578**	0.0600	0.1637	0.1122
Glasses	0.6986**	0.0333	0.7204**	0.0332
Age	0.0007	0.0013	0.0001	0.0022
Age^2	3.74E-05**	1.26E-05	4.42E-05**	2.16E-05
Male	-0.0416**	0.0036	-0.0410**	0.0038
Glasses*Age	-0.0179**	0.0014	-0.0163**	0.0027
Glasses *Age^2	0.000152**	1.36E-05	0.000133**	2.66E-05
Insurance*Glasses			-0.0845	0.1059
PostHS*Glasses			-0.0016	0.0101
College*Glasses			-0.0187	0.0132
Married	-0.0134**	0.0040	-0.0132**	0.0042
1998 Dummy	-0.0053	0.0038	-0.0045	0.0038
PostHS	0.0380**	0.0045	0.0393**	0.0071
College	0.0630**	0.0048	0.0741**	0.0083
Ln(income)	0.0052	0.0128	0.0129	0.0128
Constant	0.0155	0.1209	-0.0590	0.1226
Hausman test	-0.1069*	0.0598	-0.1330	0.1118
Adjusted R^2	0.0897		0.0922	

The symbols ** and * denotes significance at the 5 percent and the 10 percent respectively, No. of obs is 67017, Standard error in parenthesis

In Tables 2 and 4, gender only enters via a dummy variable for being male. This restricts the coefficients on our main variables, prior condition and insurance, to be the same for men and women. Are there broader differences for men and women? In our gender sub-sample tests we accept the null that the coefficients on glasses and insurance are equal for men and women. In addition, the coefficients on income and education are the same. As we discussed in Section Two, there are differences associated with age. The impact of age is different for men and women but not the major variables of importance. Marriage also has a different impact on eye care for men and women.

Individuals do not choose to be insured independently because the insurance is part of an employment benefit package. However, it is possible that those with and without insurance differ in ways that will influence our results. For that reason, we tested for the equality of coefficients for the sub-samples with and without insurance. We are unable to reject the hypothesis that the coefficients are equal with the exception of the provincial dummies. This latter result reflects the more extensive insurance coverage offered by Ontario.

The final case uses sub-samples for those with and without prior conditions to test for equality of the coefficients across the groups. We are unable to reject the hypotheses of equality of coefficients except for the age variables. These results are consistent with those in Table 4 but are more general. There is one exception. Under the sub-sample test, the coefficient on college education does not significantly vary with prior condition. This suggests the result in Table Four is not robust.

The sub-sample results support the evidence reported in Tables 2 and 4. There is no evidence that the impact of prior conditions or insurance varies with any of the three sub-groups.

4. Conclusions

Vision Care insurance is a common employee benefit. Unlike other types of health insurance it is very easy to identify those with prior conditions using glasses as an indicator. Those with glasses use eye care as much as two times as often as those without. The marginal effect of prior condition is largest among the young and decreases with age. For those with a prior condition, we might expect that vision care insurance would make little difference in their decision to visit the eye doctor. Our result suggests that insurance coverage increases the likelihood of visiting the doctor for individuals with glasses by around 25 to 30 percent. For those without a prior condition, insurance has a much more modest impact compared to those with glasses. Males and females have very similar, but not identical, behaviour in relation to eye care. They differ only due to dissimilar patterns of eye care use with aging.

Relative to the wider literature on the impact of insurance, vision care insurance offers an interesting case. This form of health insurance is widely used and has quite small net benefits. Even though the net benefits are small there is still a significant impact on the demand for care from lowering the perceived price.

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