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Sara Allin

Jeremiah Hurley

McMaster University

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Inequity in Publicly Funded Physician Care: What Is The Role Of Private Prescription Drug Insurance?

Sara Allin* and Jeremiah Hurley**

*LSE Health, London School of Economics and Political Science

**Department of Economics and Centre for Health Economics and Policy Analysis

McMaster University

Corresponding author: Sara Allin
Research Officer
LSE Health
Cowdray House, J404
London School of Economics and Political Science
Houghton Street, London WC2A 2AE
Tel: +44(0)207 955 6297
Fax: +44(0)207 955 6803
Email: s.m.allin@lse.ac.uk

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ABSTRACT

This study examines the impact that private financing of prescription drugs in Canada has on equity in the utilization of publicly financed physician services. The complementary nature of prescription drugs and physician service use alongside the reliance on private finance for drugs may induce an income gradient in the use of physicians. We use established econometric methods based on concentration curves to measure equity in physician utilization and its contributors in the province of Ontario. We find that individuals with prescription drug insurance make more physician visits than do those without insurance, and the effect on utilization is stronger for the likelihood of a visit than the conditional number of visits, and for individuals with no chronic conditions than those with at least one condition. Results of the equity analyses reveal the most important contributors to the pro-rich inequity in physician utilization are income and private insurance, while public insurance, which covers older people and those on social assistance, has a pro-poor effect. These findings highlight that inequity in access to and use of publicly funded services may arise from the interaction with privately financed health services that are complements to the use of public services.

INTRODUCTION

Private health care insurance is commonly thought to contribute to income-related inequity in health care utilization. Voluntary supplementary private health insurance – private insurance for services covered within a public insurance system that allows the holder to bypass public queues – has been particularly identified as a source of income-related inequity in the use of physician services in countries such as Australia and Ireland (van Doorslaer *et al.,* 2004; van Doorslaer *et al.,* 2007). Such inequity is one of the primary arguments against supplementary private insurance in the persistent debates over public and private financing in many countries. Such equity effects, however, should not be limited to private supplementary insurance. Private complementary insurance – insurance for services and costs *not* insured by a public plan – may also give rise to inequity in the use of publicly financed services. If the services or costs not insured by the public system but covered by voluntary complementary private insurance are complements to the use of publicly financed services, such insurance can create inequity in the use of a publicly insured service. This effect is best documented for private insurance that covers the cost-sharing provisions of public insurance plans. In both the United States and France, for example, whose public insurance systems require substantial patient cost-sharing, private complementary insurance that covers the cost-sharing provisions increases use of the publicly insured services (Atherly, 2001; Buchmueller *et al.,* 2004). Because such insurance is held disproportionately by middle and high-income individuals, researchers have argued that it contributes to the pro-rich inequity in the use of physician services in France (van Doorslaer, Masseria *et al.,*2004).

Much less studied is the extent to which private insurance for services that fall outside the public system contributes to inequity in the use of publicly insured services. Prescription drugs and physician visits, for instance, are complements: legally, in most developed countries one can only obtain a prescription drug by first visiting a physician to obtain the prescription. Obtaining a prescription is often a primary purpose of a physician visit. But most countries provide less generous public coverage for drugs than they do for physician visits (Robinson, 2002; OECD, 2007). Greater reliance on private finance for drugs can induce an income gradient in the use of physicians. Stabile (2001) estimated that in Canada those with private drug insurance were 10% more likely to make a publicly financed physician visit than those without private insurance. The impact of such spillover effects is of growing importance for drugs, which are becoming the primary treatment for many medical conditions. Drugs, however, are but one example of a more general challenge for health care financing: to the extent that

privately financed health care services are complements to use of publicly financed services, policies to achieve equitable access to and use of publicly financed services must look beyond the public system.

This paper examines the impact that private financing of prescription drugs in Canada has on equity in the use of publicly financed physician services. Canada is particularly well-suited for investigating this question. Public insurance in Canada provides universal, first-dollar coverage for medically necessary physician services and prohibits private insurance for these same publicly insured physician services.[1] Over 98% of physician expenditures are publicly financed (Canadian Institute for Health Information, 2007). In contrast, in 2005 private sources finance 53% of prescription drug expenditures (of which 34% was financed through out-of-pocket expenditures and 66% through private insurance (CIHI, 2007). Public drug insurance is limited to defined populations, primarily the over 65s and those receiving social assistance. Finally, the Canadian Community Health Survey, which is a representative sample of the community-dwelling population, includes information on physician services use, health status, socio-economic status including household income, and whether an individual has drug insurance. Among those with drug insurance, the survey further documents whether the source of the insurance is a public program, employer-provided private insurance or individual-purchased private insurance. Because private insurance for drugs is not confounded by private insurance for physician services and effectively all physician visits are publicly financed, we can identify the impact of private insurance on income-related equity in the use of publicly financed physician services.

Utilization of specialist services in Canada appears to be inequitable favouring the wealthier individuals, while use of GP services tends to be mildly, but significantly, pro-rich for the probability of a visit, and mildly pro-poor for the number of visits conditional on one visit (Allin, forthcoming; Asada and Kephart, 2007; Curtis and MacMinn, 2007; van Doorslaer *et al.,* 2006; Jiménez-Rubio *et al.,* 2007). While inequitable use of specialist care is evidenced in most countries, pro-rich inequity in the probability of a GP visit is unusual internationally (found in only three of 21 OECD countries studied - Canada, Portugal and Finland; van Doorslaer *et al.,* 2004). The positive income gradient for the likelihood of a visit, the aspect of utilization most

[1] Legally, only 4 of 10 provinces explicitly prohibit such insurance. But even in the six provinces that do not prohibit such insurance, regulations that restrict physicians' ability to provide services in both the public and private sectors and that limit the fees they can charge for private services have deterred the development of a private sector and consequently private insurance (Flood and Archibald, 2001).

controlled by the individual, may be partly explained by the interaction with the largely privately funded complementary prescription drugs.

DRUG CONSUMPTION, DRUG FINANCING, AND USE OF PHYSICIAN SERVICES

Are prescription drugs and physician services complements? Ostensibly, they are: many countries require a physician visit to obtain a prescription before an individual can obtain a prescription drug. In Canada, 60% of office-based physician consultations result in a prescription (IMS Health, 2007). A Canadian study found that one stated reason for not visiting a physician when ill was the cost of prescriptions (Williamson and Fast, 1998).

But complementarity is not the only possibility. Drugs can also substitute for physician services. A number of mental health conditions are now treated primarily with prescription drugs that previously required regular therapy visits with a psychiatrist. Similarly, prescription drugs play a large role in controlling many chronic conditions (e.g., hypertension, diabetes, heart disease) that, if not controlled properly, require increased use of physician and hospital care. Such dynamics presumably underlie the conclusions of Shang and Goldman (2007) and Anis *et al*. (2005) that drugs can be a substitute for physician care.

Estimates of the mean impact of drug insurance on physician visits will include these counter-acting complementary and substitutive relationships, potentially masking the impact of insurance. In the analysis we therefore identify situations in which we expect one of them to dominate. A lack of drug insurance is most likely to inhibit an initial GP visit, that aspect of utilization over which patients exert the greatest control. In some cases physician visits can substitute for drugs, a phenomenon we expect to be associated with a positive relationship between lack of drug insurance and the conditional utilization of physician services. We also expect drug insurance to exert a stronger influence on GP visits than on specialist visits because in the Canadian system GPs serve as gatekeepers to specialist care. Overall, however, we hypothesize that drug insurance should have the largest impact on the likelihood of a GP visit. This is consistent with Stabile (2001), which found that those with drug insurance were significantly more likely to visit a physician but did not have a higher number of visits conditional on some use, controlling for past utilization and potential selection into insurance using provincial marginal tax rates.

We also expect the impact of insurance on use to be largest among otherwise healthy people who suffer occasional acute problems (e.g., respiratory infection). Individuals with

chronic conditions are both more likely to visit their physician regularly and more likely to exhibit the substitutive relationship, muting overall estimated effect. In our analysis, we therefore estimate models separately for GP visits and specialist visits; separately for the likelihood of a visits and the conditional number of visits among users; and for the overall sample and separately for those with and without a chronic condition.

Even if drug insurance influences the use of physician visits, its impact on income-related equity of physician use also depends on whether insurance status and income are correlated in the population. Prescription drug costs in Canada may be covered in four ways: (1) provincial public drug insurance generally covers those on social assistance, those aged 65 or over, those with catastrophic expenditures (e.g., over 4% of income) and those who suffer from a small number of designated diseases[2]; (2) group-based or employer-sponsored private insurance, which covers much of the employed population and benefits from a tax subsidy (except in Québec); (3) individual private insurance (a very small segment); or (4) no coverage. Approximately two-thirds of Canadians hold private drug insurance, which finances 35% of total prescription drug expenditures (CIHI, 2007). Estimates of the proportion uninsured range from 10% of the population, based on a combination of survey and administrative data (Applied Management 2005), to 23% of the population, based on survey data (Dewa *et al.,* 2005; Kapur and Basu, 2005).The "uninsured" in most provinces are eligible for high-deductible catastrophic public insurance, although most people are not aware of this coverage and would report themselves as uninsured (Kapur and Basu, 2005; Applied Management, 2000). These institutional arrangements imply that public drug insurance is negatively correlated with income while private insurance coverage is positively correlated with income since most get it through employment in a full-time job (Dewa *et al.,*2005).

METHODS

We estimate income-related inequity in physician visits using the well-established methods based on concentration curves for utilization, which compare the cumulative distribution of health care use to the cumulative distribution of the population rank-ordered by income

[2] The details of the four options vary somewhat across the Canadian provinces; for example British Columbia has an income-, and not age-based prescription drug insurance program, and private insurance premiums are not tax-exempt in the province of Quebec. There is a possibility for double coverage, for instance publicly insured individuals, mainly the over 65s, may purchase private insurance to cover additional costs such as prescription drugs not included in the public plan, private hospital rooms, vision care, dental or allied medical services.

(Kakwani *et al.,*1997; Wagstaff *et al.,* 1991; Wagstaff and van Doorslaer, 2000; O'Donnell *et al.,* 2008). These methods involve five basic steps: (1) calculate the concentration index (CI) for unadjusted physician utilization (C_M); (2) estimate a model of the determinants of physician utilization using both need-related and non-need related variables; (3) predict needs-adjusted utilization for each individual in the sample by setting the value of all non-need variables at their sample mean during prediction; (4) calculate the concentration index for the distribution of needs-adjusted utilization (C_N); (5) calculate horizontal inequity (HI) as the difference between the unadjusted CI and the needs-adjusted CI: $HI = C_M - C_N$. A zero HI index implies that, after controlling for differences in need across income groups, all individuals have an equal number physician visits, regardless of income. A positive HI implies pro-rich inequity in which, after adjusting for need, higher-income individuals are more likely to visit the physician than lower-income individuals. A negative HI implies pro-poor inequity in which, after controlling for need, lower-income individuals are more likely to visit the physician than are higher-income individuals. To assess the contribution of drug insurance to income-related inequity in the physician utilization, we decompose the unadjusted concentration index (C_M) using the regression-based approach presented in Wagstaff (2003).

The multivariate regression models of physician visits for step (2) above are central to these methods. We estimate separate models for GP visits and for specialist visits. For each we employ the standard two-part model in which part 1 analyzes the decision to make at least one visit (i.e., use vs. no use) and part 2 analyses the number of visits conditional on being a user. The dichotomous dependent variable for part 1 and the count nature of the dependent variable for part 2 formally call for non-linear models (Deb and Trivedi, 2006). Because estimates derived from linear models often provide a good approximation to those of non-linear models and aspects of the equity analysis (especially the decomposition) are easier to implement and interpret with linear models, we compared the results when we employ non-linear models and linear models. The pattern of coefficient estimates did not differ importantly across the two approaches and the resulting HI estimates were nearly identical, so we present the linear models below. Results for the non-linear models are presented in Appendix Table A1 for comparison.

The variable of particular interest in this analysis – drug insurance – may be endogenous. The usual concern is adverse selection whereby those with above-average (unobserved) risk purchase drug insurance. Three factors mitigate concern about endogeneity in our setting. First, the largest group of individuals who hold public drug insurance are

automatically eligible because of age; there is no element of voluntary choice and therefore chance of selection. Second, over 90% of those with private insurance obtain the insurance through group plans, most often employment-based plans (Hurley and Guindon, 2007). Tying private insurance to employment may create counter-acting selection effects: selection into employment would create favourable selection into the insurance pool that would bias our findings downward; but, conditional on working, health-related selection into jobs that offer better extended health care benefits would create adverse selection. Third, the problem of endogeneity is substantially reduced when, as in our case (see below), models include good measures of health status so that any unobserved component in the residual is small (Buchmueller, 2005).[3]

Self-reported measures of insurance status may also introduce bias. Individuals who visit a physician and receive a prescription are more likely to know their true insurance status; non-users are more likely to misreport that they have no insurance. A review of studies measuring the uninsured in the US found under-reporting of coverage by the public program for low income earners – Medicaid – which the authors speculate may be due to stigma associated with public assistance programs, or because the respondent is not currently receiving health services (Lewis *et al.* 1998). Self-reported insurance status in the National Population Health Survey in Canada from 1996/7 also identifies just half of over 65 population who were eligible for public insurance reported they had insurance, and reporting was more likely among seniors who had taken prescription drugs in the past 2 days (Grootendorst *et al.,* 2003). It is not possible to measure the extent to which this bias may affect the study's results. However, because an individual's decisions regarding care are influenced by their perceived coverage (even if this perception is incorrect), one can argue that such misreporting is not an important problem for our analysis.

DATA AND VARIABLE SPECIFICATION

This study is based on the Ontario component of the 2005 Canadian Community Health Survey (CCHS). Ontario was the only province with data that distinguished private and public prescription drug coverage. The CCHS, conducted by Statistics Canada, is a cross-sectional, community-based population health survey based on a multi-stage clustered design with

[3] Using cross-provincial variation in tax rates (which are correlated with insurance status because employer-provided insurance is not included in taxable income), Stabile (2001) found evidence of modest selection effects. Such an IV approach is not possible in this single-province study.

individual occupants of private occupied dwellings as the final sampling unit. The survey response rate for Ontario was 77.2%. The Ontario sample totals 41,766 and we include 33,161 individuals after dropping children under 15 and observations with missing data.

Dependent variables

Physician utilization is measured separately for GPs and specialists, and separately for the likelihood of a visit (no visits versus one or more visits) and the number of visits conditional on at least one visit. The survey asks the respondent how many times, in the past 12 months, he or she has seen or talked on the telephone about his or her physical, emotional or mental health with a family doctor or general practitioner (GP), and an eye specialist or any other medical doctor such as surgeon, allergist, orthopaedist, gynaecologist or psychiatrist (specialist).

Independent variables

Income is measured as gross annual household income aggregated from all sources, adjusted for household size and composition using the modified OECD scale[4]. 14% of the sample did not report income and were dropped from the analysis. A further 15% reported their income categorically rather than on a continuous scale. We predicted their continuous income using a linear regression of income on income category (in ten groups), age, sex, employment status, level of food security, education, and whether they were born in Canada (R^2 = 0.89; see Appendix Table A3). Sensitivity tests indicated that study conclusions are not sensitive to inclusion of these observations with imputed values or dropping them. Results reported below include these observations.

Need-related variables included in the models of physician utilization include age, age-squared, sex, an interaction between female and child-bearing age (18-45), self-assessed health based on five categories (excellent, very good, good, fair and poor), reporting any chronic condition[5], and whether the individual reports no, moderate or severe activity limitations due to health.

[4] The modified OECD equivalence scale assigns a weight of 1.0 to the first adult household member, 0.5 to the second adult household member and 0.3 to children (as applied to CCHS data in Jiménez-Rubio et al 2007).

[5] This dummy variable equals 1 if the individual reports any of the following chronic conditions (and 0 if none are reported): asthma, fibromyalgia, arthritis, back problems, high blood pressure, migraines, chronic bronchitis, emphysema, chronic obstructive pulmonary disease, diabetes, epilepsy, heart disease, cancer, ulcers, stroke, urinary incontinence, bowel disorder, cataracts, glaucoma, thyroid condition, chronic fatigue syndrome, multiple chemical sensitivities, mood disorder, and anxiety disorder.

Non-need related variables in the models include highest level of education attained (less than secondary, secondary, some post-secondary, or post-secondary), residence in an urban area, employment status (employed, student, retired or not working) whether the individual was born in Canada, and, the variable of particular interest, drug insurance status. Drug insurance status is defined through a set of dummy variables representing the following coverage categories: no drug insurance; public drug insurance; private employer- or group-based drug insurance; and private, individual drug insurance.

STUDY RESULTS

Descriptive Statistics by Insurance Status

Table 1 presents descriptive statistics on the total sample and for the sample sub-groups defined by insurance status. Utilization of physician services varies by insurance coverage: those with no drug insurance are the least likely to have a GP and specialist visit, and make fewer visits than the insured, while individuals with public insurance are the highest users. Higher rates of healthcare use among the publicly insured is not surprising since it covers the over-65s and lower income groups in addition to individuals with high drug consumption relative to their income (the Trillium Drug Program) (Table 1). The uninsured, publicly insured and privately insured also differ in the needs and non-needs variables. In terms of health status, compared to the uninsured, the publicly insured have worse self-assessed health, more moderate limitations in activities, and greater likelihood of reporting a chronic condition than the uninsured, while the privately insured have better self-assessed health, fewer limitations in activities but are more likely to report a chronic condition. Levels of education are different across the three population groups: compared to the uninsured, the publicly insured are less educated and the privately insured are more educated. Both insured groups are more likely to reside in an urban area, are more likely to have been born in Canada, and are less likely to be a student than the uninsured. Because the large majority of private insurance is employment-based, and the over 65s are eligible for public insurance, the privately insured have higher rates of employed, and the publicly insured lower, than the uninsured. Mean income differences are also significant, with a spread of about $20,000 between the publicly insured and the privately insured. The distribution of income by prescription drug insurance category is depicted in Figure 1. It shows a clear income gradient for both government-sponsored insurance, which disproportionately covers the lower income groups, and employer-sponsored insurance, which disproportionately covers high-income groups.

Table 1 shows the majority (60%) of the Ontario population is covered by employer-based prescription drug insurance, with an additional 11% covered through the government plan and 5% with individually purchased insurance. This leaves over 23% of the population with no drug coverage. This estimate is relatively high compared to other studies; thus some people are not aware of their insurance coverage, though this underestimation is unlikely to differ for public or private coverage.

Determinants of physician service use

As expected, the most important determinant of physician service utilization is health status (Table 2). For both GPs and specialists, and for each of the likelihood of a visit and the conditional number of visits, we observe a gradient in use by self-assessed health status, activity limitation, and chronic disease status. Females are more likely to make a physician visit, but the conditional number of visits does not differ between men and women. Age is positively associated with the likelihood of a GP visit but not the conditional number of visits; it is positively associated with both for specialists.

Non-need factors are also associated with physician visit rates. Higher-income earners are more likely to have at least one GP visit and one to a specialist. Conditional on visiting a physician, however, lower-income earners have more GP visits than higher-income earners but fewer specialist visits. A person's level of education exhibits only a weak relationship with GP visits but is positively associated with both the probability of a visit and the number of visits to a specialist. Living in urban areas, where physicians are in greater supply, is associated with an increased likelihood of GP visit. The employed use fewer services than the retired and unemployed; students are more likely than the unemployed and retired to report a GP or specialist visit but have fewer visits conditional on positive use. Finally, individuals born in Canada are less likely to visit a GP and, conditional on seeing a specialist, have more visits than immigrants.

Individuals with prescription drug insurance make more physician visits than do those without drug insurance. Irrespective of the source of drug insurance, those with insurance are more likely than the uninsured to visit a GP and to visit a specialist, with similar effect sizes across the insurance groups. Those with public insurance and private group insurance also have a greater conditional number of GP visits (with a larger estimated effect for public insurance), while drug insurance is not associated with the conditional number of specialist

visits. Overall, relative to those with no drug insurance, the insured make more use of physician services after controlling for need and the relationship is strongest for the probability of seeking care. These results are consistent in both linear and non-linear models (see Appendix Table A1).

Table 3 presents a summary of the analyses stratified by chronic condition. As hypothesized, the impact of drug insurance on the likelihood of a GP is larger for those who do not have a chronic condition than it is for those with a chronic condition. Furthermore, there is no relationship between insurance and the likelihood of a specialist visit among those with no chronic condition. For those with no chronic condition, the impact on the likelihood of a visit is also larger than on the number of visits. For those with chronic conditions, our results also indicate that the complementary relationship dominates any substitutive relationship: those with insurance are more likely to visit both a GP and a specialist and to have more GP visits.

Income-related Inequity in Physician Utilization

The analyses of income-related inequity reveal small, but statistically significant, pro-rich inequity in the probability of a GP visit, and greater pro-rich inequity in the probability and conditional number of specialist visits. In contrast, there is pro-poor distribution of the conditional number of GP visits (see Figure 2; these results are consistent with non-linear models, Table A2).

Figure 3 presents the results of the decomposition analysis, depicting the contribution to income-related inequity of the non-need factors: income, education, private (combining employer-based and individual) and public prescription drug insurance coverage, and other factors (combining employment status, education, urban residence and being born in Canada). The most important contributors to pro-rich inequity in both GP and specialist care are income and private insurance. Private prescription drug insurance contributes to the observed income-related inequality in physician visits because higher income earners are both more likely to have private prescription drug insurance and to visit a GP or specialist. In contrast, government-sponsored public insurance covering mostly low income and over-65 populations has a pro-poor effect.

DISCUSSION

Our findings regarding income-related inequity in physician service use in Ontario, Canada are consistent with previous research (Allin, forthcoming; Asada and Kephart, 2007; Jiménez-Rubio *et al.,* 2007; van Doorslaer *et al.,* 2006) that has also found mild pro-rich inequity in the probability of a GP visit, pro-poor inequity in the conditional number of GP visits, and larger pro-rich inequity with respect to both the probability of and conditional number of visits to specialists. Of particular policy interest is the causes of this inequity. Some may be rooted in demand-side behaviour beyond the design of the health care system. For example, even if the system of free public insurance for physician visits has equalized access to physicians, Grossman's (1972) model of the demand for health and health care predicts that higher income individuals will both demand higher levels of health and, conditional on a given health status, demand more health care. Of greater policy concern to policy makers is the extent to which the inequity is rooted in system design. This research demonstrates that the inequity in Canada derives in part from its heavy reliance on private finance for prescription drugs, which are complementary to publicly financed physician visits. Higher income individuals are both more likely to hold private drug insurance and, in the absence of such insurance, can more easily afford out-of-pocket costs. Hence, they are less deterred from physician visits because of the expected costs of drugs often prescribed by physicians during a visit.

Drug insurance has a larger impact on the likelihood of a physician visit, the aspect of utilization over which patients have the most discretion, than the conditional number of visits, as we expected. Also consistent with our expectations, the effect of insurance on the likelihood of a GP visit was stronger for individuals without any chronic conditions. This suggests that these otherwise healthy individuals are more likely to be deterred from visiting a GP by the expected cost of prescription drugs than individuals with chronic conditions who likely have regular physician contacts, more experience with their health problems, and are more likely to substitute drugs for physician care. We also expected to find a weaker influence of drug insurance on specialist than GP physician utilization because specialist visits require a referral and are less under the control of patients; however, we found that for the likelihood of a specialist visit, insurance remained important.

While private insurance for prescription drugs contributes to the pro-rich distribution of physician service utilization, public drug insurance with the objective of protecting the vulnerable groups from financial barriers to care has a pro-poor effect. Therefore a universal, public plan as advocated by both Romanow (2002) and Kirby (2002) would not only improve access to

prescription drugs, it would better align the utilization of publicly financed physician visits with need. To the extent that services not included in the public insurance plan are complements to the use of publicly insured sources, as exemplified by prescription drugs and physician visits, efforts to improve equity in access to and use of public services must account for interactions with privately funded services.

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TABLES

Table 1. Descriptive statistics for the total sample and sub-samples defined by drug insurance status

	Total sample (N=33161)	No drug insurance (N=7606)	Public drug insurance (N=5176)	Private drug insurance (N=20379)
variable	**mean (sd)**	**mean (sd)**	**mean (sd)**	**mean (sd)**
Utilization				
Total number of GP visits	3.28 (5.17)	2.91 (4.66)	5.16* (8.02)	3.10* (4.64)
Probability of a GP visit	0.80 (0.4)	0.75 (0.43)	0.87* (0.34)	0.81* (0.39)
Conditional number of GP visits	4.09 (5.47)	3.90 (5.02)	5.96* (8.35)	3.82 (4.87)
Total number of specialist visits	1.57 (4.5)	1.22 (3.21)	2.25* (4.59)	1.58* (4.83)
Probability of a specialist visit	0.56 (0.5)	0.48 (0.50)	0.69* (0.46)	0.57* (0.50)
Conditional number of specialist visits	2.81 (5.72)	2.56 (4.27)	3.25* (5.21)	2.80* (6.16)
Need variables				
Excellent SAH	0.22 (0.41)	0.22 (0.41)	0.14* (0.34)	0.24* (0.42)
Very good SAH	0.39 (0.49)	0.39 (0.49)	0.29* (0.45)	0.42* (0.49)
Good SAH	0.28 (0.45)	0.28 (0.45)	0.31* (0.46)	0.27* (0.44)
Fair SAH	0.08 (0.27)	0.08 (0.27)	0.17* (0.37)	0.07* (0.25)
Poor SAH	0.03 (0.17)	0.03 (0.17)	0.11* (0.31)	0.02* (0.13)
Moderate limitations in daily activities	0.14 (0.34)	0.12 (0.33)	0.17* (0.38)	0.14* (0.34)
Severe limitations	0.10 (0.30)	0.09 (0.28)	0.25* (0.43)	0.08* (0.26)
No limitations	0.77 (0.42)	0.79 (0.41)	0.58* (0.49)	0.79 (0.41)
At least one chronic condition	0.72 (0.45)	0.67 (0.47)	0.87* (0.34)	0.71* (0.46)
Female	0.50 (0.50)	0.50 (0.50)	0.51* (0.36)	0.49 (0.50)
Age	43.83 (17.19)	42.24 (17.67)	58.52* (20.1)	41.91* (15.2)
Female age 18=45	0.28 (0.45)	0.29 (0.46)	0.15* (0.36)	0.30 (0.46)
Non-need variables				
Income	$41,781 (29,032)	$32,863 (26,815)	$28,636.85* (24,829.13)	$47,069.55* (28,973.61)
Less than secondary education	0.17 (0.38)	0.21 (0.41)	0.36* (0.48)	0.13* (0.34)
Secondary education	0.17 (0.37)	0.19 (0.39)	0.17* (0.37)	0.16* (0.37)
Some post-secondary education	0.08 (0.28)	0.08 (0.27)	0.08 (0.26)	0.09 (0.28)
Post-secondary education	0.57 (0.49)	0.52 (0.50)	0.465* (0.49)	0.62* (0.49)
Urban residence	0.86 (0.35)	0.84 (0.37)	0.863* (0.34)	0.87* (0.34)
Employed	0.69 (0.46)	0.65 (0.48)	0.249* (0.43)	0.78* (0.42)
Student	0.14 (0.35)	0.14 (0.34)	0.11* (0.31)	0.02* (0.36)
Born in Canada	0.69 (0.46)	0.61 (0.49)	0.67* (0.47)	0.72* (0.45)
Insurance for prescription drugs				
Public insurance	0.11 (0.31)			
Private Ins- Group	0.62 (0.49)			0.93 (0.25)
Private Ins - Individual	0.05 (0.21)			0.07 (0.25)

Note: SAH is self-assessed health; * represents significant difference with uninsured ($p<0.05$)

Table 2. OLS Analysis of the Probability a Physician Visit and the Conditional Number of Visits, GPs and Specialists

	GP				Specialist			
	Probability		Conditional no. visits		Probability		Conditional no. visits	
	Coef	SE	Coef	SE	Coef	SE	Coef	SE
Needs variables								
Very good SAH	0.042	0.009	0.433	0.080	0.031	0.011	-0.019	0.118
Good SAH	0.044	0.010	1.156	0.098	0.047	0.012	0.256	0.118
Fair SAH	0.076	0.013	2.591	0.220	0.077	0.017	1.075	0.226
Poor SAH	0.110	0.013	5.370	0.464	0.133	0.023	3.937	0.822
Moderate limitations	0.034	0.009	0.923	0.137	0.097	0.012	0.611	0.135
Severe limitations	0.063	0.008	2.367	0.201	0.119	0.013	1.823	0.225
Chronic condition	0.102	0.009	1.115	0.075	0.079	0.010	0.593	0.108
Female	0.059	0.008	0.189	0.119	0.091	0.011	0.071	0.138
Age	0.000	0.001	0.001	0.015	-0.002	0.001	0.027	0.020
Age^2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Female 18-45	0.064	0.011	0.862	0.160	0.032	0.014	0.787	0.208
Non-needs variables								
income	0.029	0.007	-0.420	0.080	0.047	0.008	0.351	0.148
Secondary education	0.014	0.011	-0.024	0.150	0.020	0.014	0.363	0.139
Some post-secondary education	0.008	0.015	0.102	0.175	0.083	0.018	0.432	0.152
Post-secondary education	0.037	0.010	0.071	0.133	0.082	0.012	0.679	0.118
Urban	0.018	0.008	0.152	0.103	-0.001	0.010	0.209	0.112
Employed	0.005	0.009	-0.479	0.135	-0.034	0.011	-0.376	0.152
Student	0.033	0.012	-0.699	0.145	0.081	0.015	-0.122	0.338
Born in Canada	-0.020	0.008	-0.035	0.096	0.006	0.010	0.277	0.114
Public insurance	0.048	0.011	0.943	0.191	0.074	0.015	0.212	0.170
Private Ins- Group	0.052	0.009	0.267	0.107	0.074	0.011	0.120	0.119
Private Ins - Individual	0.044	0.017	0.560	0.302	0.061	0.022	0.063	0.215
Constant	0.199	0.075	6.292	0.857	-0.283	0.091	-3.316	1.569
R2	0.063		0.131		0.0915		0.054	
F	51.97		79.34		82.21		14.46	
N	33161		26671		33161		19283	

Notes: Bold is significant at p<0.05; SAH is self-assessed health

Table 3. Impact of Drug Insurance on Physician Visits: Analysis Stratified by Presence of Chronic Conditions

	Total Sample		No Chronic Conditions		Chronic Conditions	
	Coef	SE	Coef	SE	Coef	SE
GP: Probability						
Income	**0.029**	0.007	**0.033**	0.015	**0.028**	0.007
Public insurance	**0.048**	0.011	**0.085**	0.038	**0.036**	0.011
Private Ins- Group	**0.052**	0.009	**0.071**	0.018	**0.042**	0.009
Private Ins - Individual	**0.044**	0.017	0.063	0.044	**0.032**	0.018
GP: Conditional visits						
Income	**-0.420**	0.080	-0.155	0.092	**-0.510**	0.105
Public insurance	**0.943**	0.191	0.457	0.304	**1.006**	0.220
Private Ins- Group	**0.267**	0.107	0.132	0.111	**0.318**	0.142
Private Ins - Individual	0.560	0.302	0.221	0.256	0.642	0.376
Specialist: Probability						
Income	**0.047**	0.008	0.028	0.017	**0.054**	0.010
Public insurance	**0.074**	0.015	0.069	0.044	**0.079**	0.016
Private Ins- Group	**0.074**	0.011	**0.060**	0.020	**0.081**	0.012
Private Ins - Individual	**0.061**	0.022	0.066	0.053	**0.059**	0.023
Specialist: Conditional visits						
Income	**0.351**	**0.148**	0.095	0.118	**0.440**	0.196
Public insurance	0.212	0.170	0.203	0.230	0.242	0.193
Private Ins- Group	0.120	0.119	0.111	0.129	0.147	0.153
Private Ins - Individual	0.063	0.215	-0.256	0.183	0.132	0.265

Notes: These models also control for all other covariates listed in Table 1. The convenient regression (Kakwani *et al.,* 1997) is used to calculate HI and their standard errors.

FIGURES

Figure 1. Income quintile distribution by prescription drug insurance category

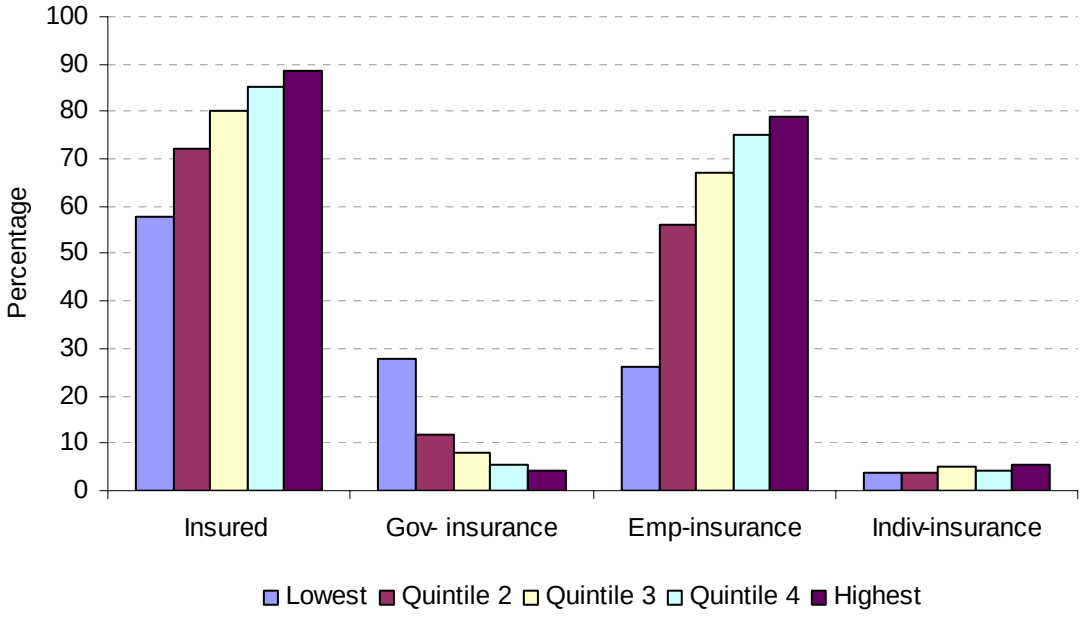


Figure 2. Horizontal inequity in GP and specialist probability and conditional number of visits (and 95% confidence intervals)

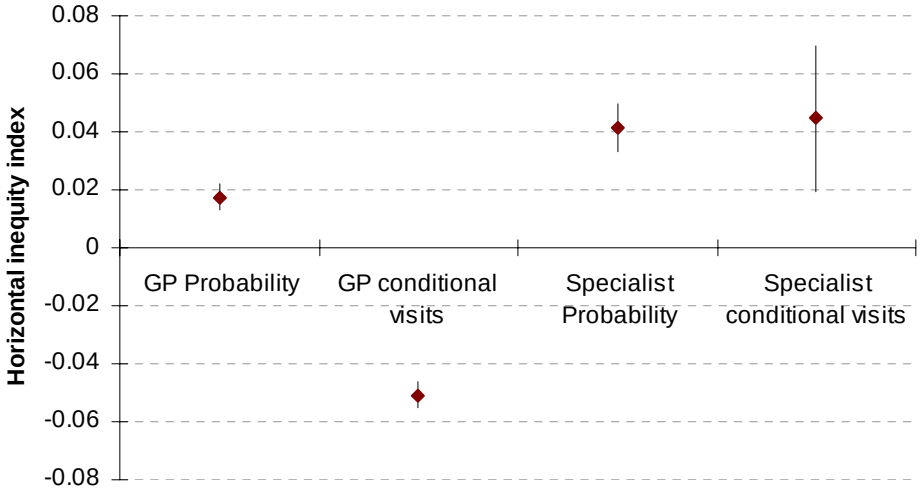
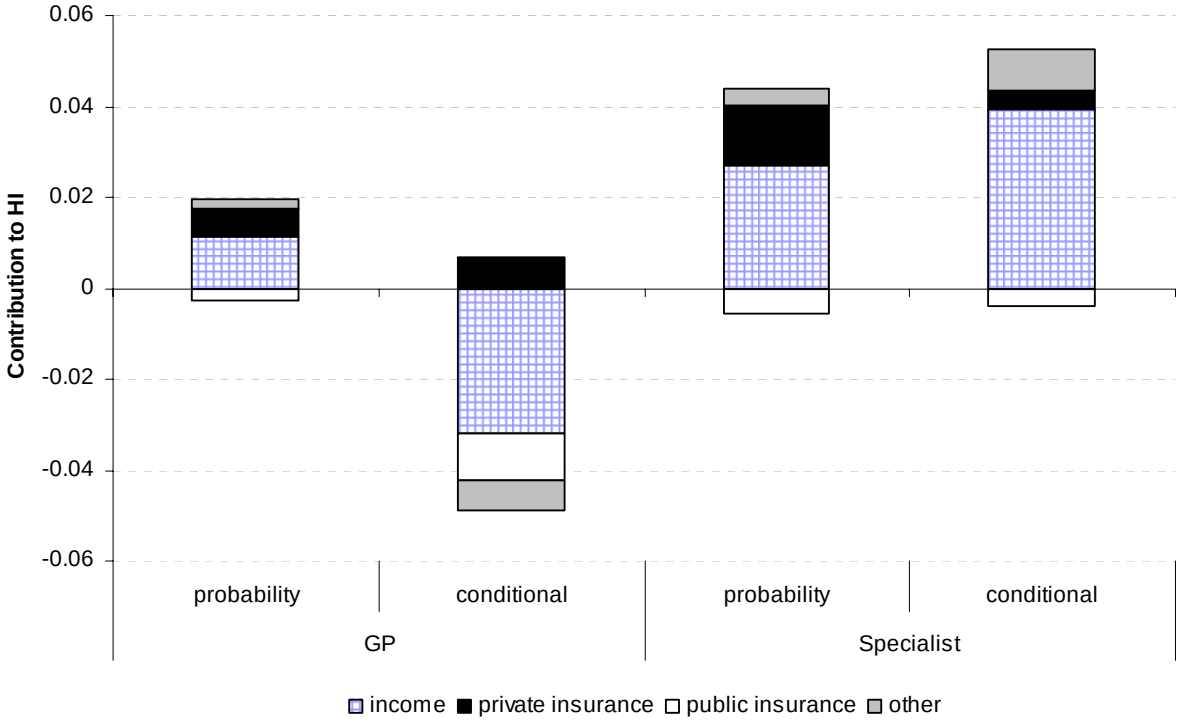


Figure 3. Components of horizontal equity in the probability and conditional number of GP and specialist visits



Notes: HI is the sum of all components; "Other" includes employment, education, urban residence, and born in Canada.

APPENDIX

Table A1. Non-linear estimations of physician utilization

	GP				Specialist			
	Probability		Conditional		Probability		Conditional	
	ME	SE	Coef	SE	ME	SE	Coef	SE
Needs								
Very good SAH	**0.039**	0.008	**0.156**	0.025	**0.032**	0.011	-0.011	0.048
Good SAH	**0.041**	0.009	**0.345**	0.027	**0.049**	0.013	0.087	0.045
Fair SAH	**0.071**	0.011	**0.576**	0.039	**0.084**	0.018	**0.317**	0.065
Poor SAH	**0.114**	0.011	**0.856**	0.053	**0.151**	0.026	**0.800**	0.104
Moderate limitations	**0.037**	0.009	**0.214**	0.028	**0.103**	0.012	**0.245**	0.045
Severe limitations	**0.075**	0.009	**0.421**	0.032	**0.130**	0.015	**0.502**	0.048
Chronic condition	**0.094**	0.009	**0.362**	0.023	**0.080**	0.011	**0.265**	0.048
Female	**0.064**	0.010	**0.057**	0.025	**0.099**	0.012	0.042	0.047
Age	-0.002	0.001	-0.004	0.003	**-0.004**	0.002	0.007	0.007
Age^2	**0.000**	0.000	0.000	0.000	**0.000**	0.000	0.000	0.000
Female 18-45	**0.051**	0.011	**0.234**	0.034	0.030	0.015	**0.263**	0.054
Non-needs								
Income (ln)	**0.029**	0.007	**-0.095**	0.019	**0.050**	0.009	**0.093**	0.045
Secondary education	0.017	0.011	0.005	0.030	0.028	0.015	**0.144**	0.046
Some post-secondary education	0.011	0.014	0.022	0.039	**0.092**	0.018	**0.161**	0.052
Post-secondary education	**0.041**	0.010	0.028	0.026	**0.095**	0.013	**0.255**	0.038
Public insurance	**0.043**	0.011	**0.179**	0.034	**0.078**	0.016	**0.093**	0.048
Private Ins- Group	**0.049**	0.008	**0.068**	0.026	**0.079**	0.011	0.037	0.038
Private Ins - Individual	**0.037**	0.015	0.132	0.068	**0.063**	0.023	0.022	0.074
Urban	**0.019**	0.008	0.032	0.024	0.000	0.010	**0.072**	0.036
Employed	0.007	0.009	**-0.104**	0.027	**-0.034**	0.012	**-0.116**	0.041
Student	**0.028**	0.011	**-0.163**	0.035	**0.081**	0.016	-0.009	0.129
Canada born	**-0.021**	0.008	-0.022	0.022	0.006	0.011	**0.084**	0.038
Constant	**-1.217**	0.276	**1.753**	0.212	**-2.039**	0.251	**-0.874**	0.410
Alpha			0.394	0.012			0.546	0.028

Note: Probit estimations are used for probability models (ME= marginal effects); negative binomial regression estimations are used for the models of conditional number of visits. For Negative binomial models, *alpha* is the estimate for over-dispersion.

Table A2. Comparison of HI with linear and non-linear models

		Non-linear	Linear
GP	Probability	0.017	0.017
	Conditional number of visits	-0.050	-0.051
Specialist	Probability	0.042	0.041
	Conditional number of visits	0.045	0.045

Note: all HI indices are significant at $p<0.05$. The convenient regression (Kakwani et al., 1997) is used to calculate HI and their standard errors.

Table A3. Auxiliary Linear regression to impute Income for subset of observation with categorical income information (dep var: ln(income))

	Coef.	Std. Err.
Socio-demographics		
Age	**0.002**	0.001
Age^2	**0.000**	0.000
Male	**0.012**	0.004
Employed	**0.028**	0.005
Student	**-0.030**	0.007
Household size (continuous variable ranging from 1-14)	**-0.159**	0.002
Resides in Toronto	**0.023**	0.007
Born in Canada	**0.029**	0.005
Marital status: married	**-0.064**	0.005
Marital status: common-law	**-0.070**	0.007
Marital status: single	**-0.043**	0.006
Education: secondary	-0.003	0.006
Education: some postsecondary	0.000	0.008
Education: postsecondary degree/diploma	**0.032**	0.004
Income category		
<$5000 (no income, reference category)	(dropped)	
$5000-10,000	**0.344**	0.032
$10,000-15,000	**0.621**	0.031
$15,000-20,000	**0.825**	0.030
$20,000-30,000	**1.056**	0.030
$30,000-40,000	**1.298**	0.030
$40,000-50,000	**1.483**	0.030
$50,000-60,000	**1.642**	0.031
$60,000-80,000	**1.834**	0.031
$80,000-100,000	**2.034**	0.031
$100,000+	**2.445**	0.031
Constant	**9.251**	0.034
Sample size	28267	
R^2	0.889	
F(24, 28242)	5955.75	

Note: bold is significant at p<0.05