Risk Adjustment, Premiums and Efficient Sorting Among Plan Types: Application to Plan-Level Choice in Health Insurance Exchanges

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1. Introduction

In important individual health insurance markets in the U.S., private plans in Medicare and the new state-level Exchanges created by the Affordable Care Act (ACA), health plans are (or soon will be) paid by a combination of risk-adjusted payments and premiums from enrollees. In Medicare, private plans offering comprehensive medical care (Part C) or drug coverage (Part D) set a single premium. Costs of both Parts C and D are heavily subsidized by the federal government through risk-adjusted payments so these premiums now pay for a small portion of costs. It seems inevitable, however, that enrollee premiums will be called upon to finance a bigger share of Medicare costs, and under proposals for Medicare reforms centered around "premium support," premiums would also vary by beneficiary characteristics. In contrast to Medicare, ACA Exchange plans in aggregate are to be fully financed by premiums (though many individuals will receive a subsidy), and premiums can differ based on some enrollee characteristics. State Exchange authorities will pool and risk-adjust premiums before returning funds to participating private plans. Although the flow of funds works differently in Medicare and in the Exchanges, these two individual health insurance markets share an overriding economic principle: incentives and behavior of plans and enrollees will be influenced both by risk adjustment and by the premiums that emerge on the regulated private markets.

The normative and positive literature on risk adjustment is extensive, whereas research on premiums is less well-developed. Our paper contributes in two ways. First, we provide the first characterization of "second-best" health insurance premiums, by which we mean the welfare-loss minimizing premium for a group of heterogeneous consumers who must, by regulation, pay the same premium. In the ACA, for example, premiums cannot differ by gender or prior health conditions, even though costs vary systematically and predictably by these factors. We know what first-best premiums

are: with two plan levels (e.g., Gold and Silver) the incremental premium for the higher level should be incremental marginal cost for each type of person, calling for infeasible premium discrimination. Second-best premiums minimize the welfare loss from divergence from the first-best premiums. Our measure of welfare loss is the familiar harberger triangle from welfare economics, summed over the groups of consumers sharing a common premium. We show that the loss can be expressed as a function of elements available in data, leading to an operational and numerical solution for the second-best premiums. Notably, the second-best premium is not the zero-profit premium that would be set by plans competing in the health insurance market.

Second, we integrate this second-best premium policy with risk adjustment, theoretically and empirically. Our theoretical perspective stems from a fundamental tradeoff. Risk adjustment and premium systems serve two economic functions: pay plans to discourage selection-type behavior, and charge enrollees so that they choose the efficient plan for them. More powerful risk adjustment helps in one way but hurts in the other. Fitting payments more closely to individual expected costs reduces plan selection behavior, but, by homogenizing the net costs to a plan taking enrollees with different expected costs, compresses market premiums across risk groups. Premium compression distorts enrollee choices of plans. For example, suppose in an Exchange context with a Gold and Silver Plan, a risk adjustment system using age and health status fully accounts for all of the expected cost differences across age groups. The market equilibrium premiums for Silver and Gold would then only reflect overall average cost differences between the plans. The (inexpensive) young would pay premiums above their expected cost in both the Silver and Gold Plans, subsidizing the (expensive) old. Some young would inefficiently avoid the Gold Plan and would face the very undesirable incentive to avoid participating in the Exchange at all. The old would be inefficiently subsidized to join a Gold plan, increasing health care costs.

We characterize the risk adjustment weights that maximize fit of the payment system subject to a set of constraints that the market premiums be second-best. Maximizing fit means matching the net revenue a plan receives for each enrollee to the enrollee's cost as closely as possible and is measured by a sum of squared residuals. We derive the following theoretical result with immediate empirical

implications: the risk adjustment weights that lead to the best fit subject to second-best premiums can be found by a constrained least-squares regression. The constraints impose zero profit on plans at the second-best premium, assuring that in market equilibrium, premiums will be second-best. The constrained regression is a straightforward modification of conventional statistical approaches to risk adjustment. We implement our empirical methods on a population of likely Exchange participants drawn from six panels of the Medical Expenditure Panel Survey (MEPS). To evaluate the tradeoff between efficient plan sorting and incentives to select, we compare the payment system fit and loss from inefficient sorting between Gold and Silver Plans with conventional risk adjustment (ignoring any effect on premiums) to risk adjustment with second-best premiums. Our main empirical finding (anticipated) is that imposing the premium constraints in a risk-adjustment regression gains a good deal in terms of the efficiency of improved sorting, but imposes a small cost in terms of payment system fit.

Section 2 reviews the normative literature on health insurance choice and premiums, noting the absence of an operational measure of the efficiency of sorting in health insurance markets. Section 3 presents a model of a private health insurance market in which individuals choose between Gold and Silver plan levels. We characterize sorting and premiums, develop a measure of the welfare loss associated with premiums that must be common for groups of varying risk, and find the second-best set of premiums. Welfare loss and second-best premiums can be figured based on commonly available data in claims. Section 4 introduces the two conflicting goals of risk adjustment, fit and plan sorting. For a given risk adjustment system (such as the CMS-HCC model we use here), we derive statistical methods for finding the risk adjustment weights that maximize payment system fit subject to the restriction that market premiums are second-best. Section 5 implements these methods with data from six two-year panels of the Medical Expenditure Panels Survey (MEPS) with a population eligible for a simulated state Exchange in the ACA.[1] We conduct two empirical analyses of risk adjustment, giving primacy to one or the other of the objectives of a payment system. In a first analysis, we maximize fit (and keep track of the

[1] These data are in use by the authors. An "Exchange population" from five MEPS panels has been used previously. One more panel will be available Fall, 2012. By Summer, 2013, we hope to extend the empirical application to a large claims database.

welfare loss due to inefficient sorting). In a second analysis we minimize loss from inefficient sorting (and keep track of the fit of the payment system). The risk-adjustment/premium system is implemented based on rules from the ACA and Exchanges, but the empirical methods are also applicable to premium-support policies as have been proposed for Medicare. Section 6 discusses the next steps for research.

2. Background and Literature Review

3. Model: Premiums and Sorting Between Plan Levels

3.1 Costs and Benefits in Two Health Plan Alternatives (selected text defining terms)

N people in an insurance pool vary in two observable dimensions, according to health status, the basis of risk adjustment, and according to another set of characteristics, the basis of premiums. Health status is indexed by h, h = 1,…,H; premium characteristics are indexed by t, t = 1,…,T.

Each person must choose one of two health plans, referred to as Gold and Silver. Plans provide services, x, according to h and t, and services a person of type ht would get are fixed in each plan. Gold is more generous so that $x^g_{ht} > x^s_{ht}$ for all ht, with x measured in dollars. x^g_{ht} and x^s_{ht} are thus also the costs of serving a person of type ht in the Gold and Silver plans respectively. Let n_{ht} be the number of people of type ht. If a plan draws a representative set of enrollees from the population, the average cost in the Gold Plan is $\bar{x}^g = \frac{\sum_h \sum_t n_{ht} x^g_{ht}}{N}$, and similarly for $\bar{x}^s$. Health care costs, x, are plan costs (which must be covered by plan payments) and do not include any copayments.

Benefits are b(x). Within each ht group, consumers are heterogeneous in their valuation of health care services. To represent this, we index individuals by i, and designate benefits of person i of type ht to be $b^i(x^g_{ht})$ for Gold and $b^i(x^s_{ht})$ for Silver where i ε {ht}. {ht} is the set of individuals of type ht. Thus, among the individuals of type ht, valuation of the services they would get in a plan can vary.

We further define $n_h = \sum_t n_{ht}$, the number of people with health status h, and $n_t = \sum_h n_{ht}$, the number of people of with personal characteristics t.

3.2 First-Best Sorting Between Plan Levels and First-Best Premiums (incremental mc for type ht)

3.3 Welfare Loss with Two Groups, Two Costs and One Price (general points about a common price)

3.4 A Measure of Welfare Loss from Sorting and the Second-Best Premium

We can express the second-best incremental premium as a function of elements available in data:

$$\Delta p_t^* = \frac{\delta \sum_h \frac{n_{ht}}{x_{ht}^s}}{\sum_h \frac{n_{ht}}{(x_{ht}^s)^2}} \qquad (9')$$

[δ is a parameter representing the actuarial value of Gold relative to Silver.]

4. Risk Adjustment to Fit Payments to Costs and to Support Efficient Sorting

4.1 Dual Roles of Payment Systems and Risk Adjustment

4.2 Risk Adjustment with Multiple Levels of Plans (we risk adjust Silver Plan costs)

4.3 The Payment System in an Exchange (linking risk adjustment to equilibrium premiums)

Plans are financed by premiums paid by enrollees subject to risk-adjustment by a Regulator. The key sets of equations are in (11) and (12). Given a set of risk adjustment weights, the zero-profit premiums for each t group in each plan level can be found by assuming a plan breaks even for a random distribution of enrollees. For the Silver Plan:

$$p_t^s + \{ \frac{1}{n_t} \sum_h n_{ht} r_h - \bar{x}^s \} - \frac{1}{n_t} \sum_h n_{ht} x_{ht}^s = 0 \qquad (11)$$

$$p_t^g + \{ \frac{1}{n_t} \sum_h n_{ht} r_h - \bar{x}^s \} - \frac{1}{n_t} \sum_h n_{ht} x_{ht}^g = 0 \qquad (12)$$

4.3 Metrics for Fit and Efficiency Loss from Sorting (a RSS measure and a welfare loss from sorting)

4.4 Conventional Risk Adjustment

4.5 Risk Adjustment to Support Second Best Premiums (derivation of the constrained LS regression)

5. Empirical Application

5.1 Data and the Exchange Population (defining an Exchange population in MEPS)

5.2 Risk Adjustment and Plan Revenues (details of risk adjustment using CMS-HCCs)

5.3 Results (compares fit and sorting for conventional RA and RA with second-best premiums)

6. Discussion and Next Steps