Selecting Negotiation Processes with Health Care Providers*

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Abstract

We address the question of how a third-party payer (e.g. an insurer) decides what providers to contract with. Three different mechanisms are studied and their properties compared. A first mechanism consists in the third-party payer setting up a bargaining procedure with both providers jointly and simultaneously. A second mechanism envisages the outcome of the same simultaneous bargaining but independently with every provider. Finally, the last mechanism is of different nature. It is the so-called "any willing provider" where the third-party payer announces a contract and every provider freely decides to sign it or not. The main finding is that the decision of the third-party payer depends on the surplus to be shared. When it is relatively high the third-party payer prefers the any willing provider system. When, on the contrary, the surplus is relatively low, the third-party payer will select one of the other two systems according to how bargaining power is distributed.

Keywords: Bargaining, health care provision, Any willing provider.

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1 Introduction.

A major change in the health care sector worldwide is in the contractual arrangements between payers and providers of care. Countries with provision of health care organized around explicit contracts, like the U.S., moved from retrospective to more prospective payment systems. Preferential provider arrangements have also been introduced. Countries with a delivery of health care based on National Health Systems seek to introduce some sort of explicit contracting. Again, the definition of a contract implies specification of which organizations enter the contract. Frech (1991) provides an overall account of the elements involved in the design of doctors' fees (see also Charatan (2000)). Moreover, Brooks et al. (1997) documents empirically the importance of bargaining and the evolution of the bargaining position between an third-party payer and a hospital in the case of appendectomy pricing.

In this paper, we address the question of how an third-party payer decides what providers to contract with. To illustrate, we consider one third-party payer and two providers. The provision of health care is produced at constant (zero) marginal cost.

We analyze three different mechanisms and compare their properties. A first mechanism consists in the third-party payer setting up a bargaining procedure with both providers, jointly and simultaneously. A second mechanism envisages the outcome of the same simultaneous bargaining, but independently with every provider. Finally, the last mechanism is of different nature. It is the so-called "any willing provider" where the third-party payer announces a contract and every provider freely decides to sign it or not.

There are other possible mechanisms of interest. Among them, we can point out a sequential bargaining so that after the third-party payer has finished the procedure with one provider, it starts a new one with the second provider. Conducting sequential negotiations may nevertheless increase considerably transaction costs. The implications of sequential bargaining are left for future research.

We propose the Nash Bargaining solution as the equilibrium concept. Extensive presentations of the non-cooperative bargaining theory are Binmore et al. (1986), Osborne and Rubinstein (1990) or Roth (1985). Also, a short introduction is provided by Sutton (1986).

We insert this paper in a more general research project analyzing the relationship between third-party payers and providers in the health care market. The interest of this research line lies in the study of mechanisms combining health care insurance contract in a differentiated product setting aiming at the control of the expenditure in the health care sector. We can think of that relationship at the outcome of a three-stage game. In a first stage, the third-party payer (be it a NHS or private insurance companies) offers health insurance contracts to consumers. Such contracts specify insurance premiums, the providers the individuals have access to when ill, and the associated copayments. In a second stage, each insurance company defines the set of selected providers to which the individuals that have contracted a health insurance have access to when ill. Finally, in the third stage of the game, providers compete in prices and qualities in the market. The competitive process among providers is influenced by every one of them having been selected, or not, by an insurance company to provide health care services to its population of insured individuals.

We tackle the third stage of the game in Barros and Martinez-Giralt (2000). In particular, the model in Barros and Martinez-Giralt (2000) studies the competitive effects on providers from different reimbursement rules.

The present paper looks at the second stage of the game, that is, we analyze how an insurance company decides the selection of providers to which the individuals contracting a health care insurance will have access to. To make the problem tractable, we consider one third-party payer and two providers. We also take the perspective of an third-party payer at the beginning of its activity and has a set of providers to choose among. The decision of the third-party payer consists in negotiating the price at which to reimburse the health care services offered to patients insured with the company. We look at this problem from three different angles. The third-party payer may bargain the reimbursement policy (i) jointly with both providers; (ii) separately (but simultaneously) with each provider; or may decide a "any willing provider" policy, that is, to announce a price at which it is willing to reimburse the services and let the providers freely decide whether they accept the proposal or not. Naturally, an important element of the analysis is the relative bargaining power of the different agents involved. The question we address is what of these procedures should a third-party payer select.

The paper is organized in the following way. Section 2 lays down the model structure. In section 3 we report the equilibrium solution under separate bargaining, and describe the equilibrium characterization associated with "any willing provider" contracts. Next, section 4 discusses the optimal negotiation format. Section 5 extends the analysis to an arbitrary number of providers. Finally, section 6 concludes.

2 The model.

To be precise, we assume that there is population of consumers with a potential health problem. Each member of the population has a given probability of being sick. We assume that the expected mass of consumers demanding health care is 1 and it is distributed uniformly on a $[0, 1]$ horizontal differentiation line. Each consumer demands one unit of health care in the event of illness. The horizontal differentiation line represents the differences providers have at consumers eyes. It can be objective, like geographic distance, or subjective, such as personal taste for one provider over the other.[1]

The insurance contract defines a premium to be paid by consumers, which is taken as given at the moment of the negotiation with providers. Total revenues of the insurance company are exogenously given. When selecting providers, the third-party payer has already collected the insurance premia/contributions from consumers.

[1] Implicitly, we assume that there are no quality differences across providers. Otherwise, a vertical differentiation dimension would have to be added to the problem. For quality issues in the provision of health care in the context of vertical differentiation models see Jofre-Bonet (2000) and the references therein.

We restrict attention to the situations where the third-party payer contracts with at least one provider. The case of not contracting with any provider means that no insurance is, in fact, given. It cannot be an equilibrium contract of the full, three-stage, game. We ignore it in the ensuing analysis. We also assume, for simplicity, zero production costs in the provision of health care. Our qualitative results are insensitive to this simplifying assumption.

We assume that consumers always take full insurance (i.e. $c = 0$). Even in the presence of operating costs (recovered by insurance companies through a loading factor) and/or not all providers being included in the insurance plan, we take the consumer to contract full insurance. The assumption is made for simplicity and, again, does not change the qualitative features of the model. We can see it as a result of the insurance company offering only full insurance. To justify somewhat the assumption, we also consider that a consumer when signing the insurance contract does not know beforehand the position (s)he will have in the horizontal differentiation line when sick. The location of the consumer in the horizontal differentiation characteristic is independent of the probability of occurrence of the illness episode. In terms of insurance choice models, this adds a background risk to the demand for insurance, thus reinforcing the demand for insurance (Eeckhoudt and Kimball, 1992). The population we study is made of patients and it is conceivably, a subset of all people insured. In the first-stage of the game, individuals face several possible states of the world (for example, healthy or sick). The uncertainty faced at that stage determines health insurance demand. After realization of uncertainty, if an individual is sick, demands health care. We focus on this second stage, and leave the analysis of the insurance contract (and of competition) in the first-stage for future research. The present discussion can be seen as a building block for that more comprehensive approach.

Generically, providers may have different bargaining powers, so that the distribution of bargaining power will involve a parameter constellation for the third-party payer and the two providers respectively. However, we are interested in comparing different systems of negotiation between a third-party payer and a set of providers. To keep focus in this issue we will assume that all providers have the same bargaining power, so that they will be symmetric in all respects. We could think of asymmetries in bargaining power as a way to capture differences in technology, size, quality, etc. among providers. In turn, this would imply that we would have to allow providers to react to the differential characteristic (e.g. invest in size, R& D, quality, etc.) introducing an additional stage in the game. It our perception that this implied modeling would add little to the understanding of the performance of different ways in which the negotiation process is organized.

We discuss the implications of this assumptions at the end of the paper.

3 Alternative bargaining procedures.

3.1 Separate bargaining.

By separate bargaining we refer to the situation where the third-party payer carries negotiations simultaneously but independently with the providers. The third-party payer has a bargaining power strength parameter given by δ and each provider is endowed with $1-\delta$. Note that this situation does not correspond to a process where after failing to close a deal with one provider, the third-party payer addresses the second one. In our scenario, the provider when accepting or rejecting a deal *does not know* the outcome of the other parallel negotiation process.

Three scenarios may appear. Both providers accept the deal offered by the third-party payer, none accepts, or only one accepts the deal. We start by introducing some notation. Let R be (exogenous) premia collected by the third-party payer. At the moment when the third-party payer negotiates with providers, the prices of services delivered, the premia, have already been collected. F denotes the penalty to the third-party payer when one provider does not accept. This penalty is left unspecified at this stage. It captures the point that an insurer giving access to a smaller set of options in health care provision faces a cost to it (for example either reputation or money returned to insured people). $\widehat{\Pi}$ are third-party payer's profits; Π_i are profits to provider i when both providers accept; $\widetilde{\Pi}_i$ are profits to provider i when it accepts while j does not accept; $\overline{\Pi}_i$ are profits to provider i when it does not accept while j accepts, and, finally, $\underline{\Pi}_i$ are profits to provider i when neither provider accepts.

The revenues obtained by the third-party payer when both providers accept the deal are given by $R - \Pi_A - \Pi_B$. When only, say, provider A accepts the revenues to the third-party payer are $R - \widetilde{\Pi}_A - F$. Finally, if no provider accepts the deal the third-party payer obtains zero revenues.

We deal first with the conditions to be satisfied such that both providers accept.

Given our assumption of full insurance, an equilibrium with both providers accepting exists, given the symmetry between providers, when the same price prevails for both. Hence, providers will share the market evenly and their profits will be given by half of the respective equilibrium price.

The negotiation with provider A is described by the following problem,

$$\max_{P_A} \Big[(R - \Pi_A - \Pi_B) - (R - F - \widetilde{\Pi}_B)\Big]^{\delta} (\Pi_A - \overline{\Pi}_A)^{(1-\delta)}.$$

The fallback level of the third party payer is defined by the profits it obtains under the agreement with the other provider, net of the penalty associated to a smaller set of providers than the maximum possible.

Similarly, the negotiation with provider B is given by,

$$\max_{P_B} \Big[(R - \Pi_A - \Pi_B) - (R - F - \widetilde{\Pi}_A)\Big]^{\delta} (\Pi_B - \overline{\Pi}_B)^{(1-\delta)}$$

From the symmetry of providers, $\widetilde{\Pi}_A = \widetilde{\Pi}_B = \widetilde{\Pi}$ and $\overline{\Pi}_A = \overline{\Pi}_B = \overline{\Pi} = t/8$. The first order conditions of the maximization problems yield,

$$P_i = 2(1-\delta)(F + \widetilde{\Pi} - \frac{1}{2}P_j) + \frac{\delta t}{4}, \quad i, j = A, B;\ i \neq j.$$

Solving the first order conditions and defining $\widetilde{R} \equiv F + \widetilde{\Pi}$ we obtain the (symmetric) prices:

$$\widetilde{P} = \frac{2(1-\delta)}{2-\delta}\widetilde{R} + \frac{\delta t}{4(2-\delta)} > 0.$$

These (positive) prices are equilibrium prices if two additional consistency conditions are met: (i) no provider wants to leave the agreement and (ii) the third-party payer obtains non-negative revenues. Condition (i) requires $\Pi(\widetilde{P}) = \widetilde{P}/2 \geq \overline{\Pi}_i = t/8$. This is satisfied iff $\widetilde{R} > t/4$. Condition (ii) is fulfilled iff $R \geq \widetilde{P}$.

Take now the case of only one provider accepting the price determined in the negotiation process.

Assume that provider i accepts the deal while provider j rejects it. The negotiation process between the third-party payer and provider i is described by,

$$\max_{P_i}(R - \widetilde{\Pi}_i - F)^{\delta}(\widetilde{\Pi}_i - \underline{\Pi}_i)^{1-\delta}.$$

The solution of this problem is given by,

$$\begin{aligned} P_i =& \frac{4}{3}\Big(\frac{\delta t}{2} + (1-\delta)(R-F)\Big); \quad P_j = \frac{t}{2}; \\ \widetilde{\Pi}_i =& \frac{\delta t}{2} + (1-\delta)(R-F); \quad \overline{\Pi}_j = \frac{t}{8}; \quad \text{and,} \\ \widehat{\Pi} =& \delta\Big(R - F - \frac{t}{2}\Big). \end{aligned}$$

The pair (P_i, P_j) will constitute an equilibrium price pair if (i) providers' prices and third-party revenues are non-negative and (ii) provider i is not willing to quit the agreement (i.e. $\widetilde{\Pi}_i \geq \underline{\Pi}_i$) and provider j does not want to join it (i.e. $\overline{\Pi}_j \geq \Pi_j$).

Third-party revenues are non-negative iff $R - F \geq t/2$. This condition is also sufficient to ensure that $P_i \geq 0$ and that provider i does not have incentives to leave the agreement. Provider j does not want to join iff $R \leq t/4$.

Note that the latter condition is not compatible with the former, so that we cannot have an equilibrium with only one provider accepting the negotiation with the third-party payer under separate bargaining.

We can summarize the discussion in the following proposition.

Proposition 1. *Under separate bargaining, it is not possible to find an equilibrium configuration where only one provider accepts to negotiate with the third-party payer.*

Moreover, when $\widetilde{R} \geq t/4$ and $R \geq \widetilde{P}$, the equilibrium price with both providers negotiating with the third-party payer is given by $\widetilde{P} = \frac{2(1-\delta)}{2-\delta}\widetilde{R} + \frac{\delta t}{4(2-\delta)}$.

This proposition implies that one cannot have under explicit bargaining procedure with similar providers the case of one joining the agreement and the other not. The disadvantage in terms of demand from being left out is higher than the advantage of being a price-setter. Moreover, it is not clear that the equilibrium price is smaller than the one prevailing on the stand-alone market (that is, without insurance to consumers). The condition for a higher price in the separate bargaining model relative to the stand-alone case is $\widetilde{R} \geq t/2$, which is compatible with the conditions for existence of a separate bargaining equilibrium.

3.2 Joint bargaining.

Our approach to the bargaining mechanism is non-cooperative, that is, even when the third-party payer decides to negotiate jointly (in the same room) with both providers, we assume that they are not able to cooperate. The analysis of coalitions in bargaining models can be found e.g. in Horn and Wolinsky (1988a,b) and Jun (1989). Also, in this line Chae and Heidhues (1999) and Heidhues (2000) propose a bargaining theory explaining the advantage of integration across independent markets. In a different but related approach, Calvo-Armengol (1999a,b) analyzes the optimal selection of a bargaining partner when communication among partners is graph-restricted, that is when the decision of who are the two parts that get together to negotiate are determined by those individuals in the population that are in direct contact with. A different way to proceed would be to assume that an association bargains on behalf of its members. This however, raises several other issues. One of them is the commitment of each provider not to negotiate individually if the negotiation made by the association does not succeed. A second issue is whether the negotiations are done openly, that is, in a way that can be easily monitored by the principals (providers), or behind closed doors. We do not address the delegation issue here.[2] Instead, we assume that the negotiation process, even if conducted by an association on behalf of providers, mimics the result of simultaneous bargaining with all providers.

[2] The interested reader is referred to Fingleton and Raith (2000).

Two sets of alternative assumptions come naturally to mind regarding the distribution of bargaining power:

a) The third-party payer keeps bargaining strength δ and providers share evenly the remaining bargaining power.

b) Providers keep their bargaining strength $(1-\delta)$ and the third-party payer has bargaining strength given by $2\delta - 1$ (also requiring $\delta > 1/2$).

In case a), the third-party payer does not lose bargaining power by conducting a joint negotiation compared to the separate bargaining case. In some sense, conducting a joint bargaining procedure is a way to make the providers weaker. On the other hand, in case b), the third-party payer loses bargaining power in joint bargaining with respect to the separate bargaining. These two cases are sufficient to show that either negotiation process can be preferred by the third-party payer , depending on how much bargaining power the third-party payer retains relative to the providers.

3.2.1 Constant third-party payer's bargaining power.

Consider that when bargaining jointly the third-party payer retains its bargaining power. The problem to solve is:

$$\max_{P_A, P_B} \left((R - \Pi_A - \Pi_B) - (R - F - \widetilde{\Pi}) \right)^{\delta} \left(\Pi_A - \bar{\Pi}_A \right)^{\frac{1-\delta}{2}} \left(\Pi_B - \bar{\Pi}_B \right)^{\frac{1-\delta}{2}}$$

where $\widetilde{\Pi}$ represents the payment to provider i assuming that in case of breakdown of one negotiation, the third-party payer maintains the negotiation with the other provider. Since we are assuming identical providers, $\widetilde{\Pi}$ is independent of the selected provider to negotiate with. To complete the reading of the maximization program, note that $\bar{\Pi}_i = t/8$.

The solution of the maximization program yields a symmetric (candidate) equilibrium price,

$$\widetilde{P} = (1-\delta)\widetilde{R} + \frac{\delta t}{4} > 0.$$

This equilibrium price has to be consistent with (i) the non-negativity of the third-party payer revenues ($\widehat{\Pi} = R - \widetilde{P} \geq 0$) and (ii) the incentives of the providers to stay in the agreement ($\Pi_i \geq \bar{\Pi}_i \Leftrightarrow \widetilde{R} \geq t/4$). This last condition essentially requires a positive surplus to be shared once the fallback levels have been taken into account ($R - (R - \widetilde{\Pi} - F) - t/8 - t/8 > 0$).

3.2.2 Constant bargaining power of providers.

Consider now a joint bargaining procedure where providers to retain their bargaining power vis-a-vis the third-party payer. The joint bargaining solution solves:

$$\max_{P_A, P_B} \left((R - \Pi_A - \Pi_B) - (R - F - \widetilde{\Pi}) \right)^{2\delta - 1} \left(\Pi_A - \bar{\Pi}_A \right)^{1-\delta} \left(\Pi_B - \bar{\Pi}_B \right)^{1-\delta},$$

where $\widetilde{\Pi} = (1 - \delta)(R - F) + \delta t/2$ has the same interpretation as before and naturally, $\bar{\Pi}_i = t/8$.

The equilibrium price (identical for both providers) is:

$$\widetilde{P} = 2(1 - \delta)\widetilde{R} + \frac{(2\delta - 1)t}{4} > 0,$$

where the positivity of the price comes from the fact that the bargaining power of the third-party payer ($2\delta - 1$) has to be strictly positive. Substituting the value of $\widetilde{\Pi}$ we obtain,

$$\widetilde{P} = \left(\frac{2\delta - 1}{4} + \delta(1 - \delta) \right) t + 2(1 - \delta)^2 R + 2\delta(1 - \delta)F$$

As usual, this equilibrium price has to be consistent with (i) the non-negativity of the third-party payer revenues (i.e. $\widehat{\Pi} = R - \widetilde{P} \geq 0$) and (ii) the incentives of the providers to stay in the agreement (i.e. $\Pi_i \geq \bar{\Pi}_i \Leftrightarrow \widetilde{R} \geq t/4$). Taking both cases together, the following proposition summarizes the results.

Proposition 2. *Under joint bargaining, the two providers will stay in the agreement if $\widetilde{R} \geq t/4$ and $R \geq \widetilde{P}$, both when the third-party payer keeps the bargaining power and when the providers retain the bargaining power. No configuration with a single provider appears in equilibrium.*

The last part of the proposition follows from the fact that one provider leaving the agreement and the other staying in takes the analysis back to the separate bargaining case with only one provider accepting the agreement.

3.3 "Any willing provider" contracts.

A different way of contracting health care services is frequently used by Governments and, to some extent, by private health plans or insurance companies: the payer announces a price, and providers decide, on a volunteer basis, to join (or not) the agreement. This is known as "any willing provider" contracts. Simon (1995) studies both the characteristics of the states that have enacted AWP laws and their effect on managed care penetration rates and provider participation. Also, Obsfeldt et al. (1998) explore the growth of AWP laws applicable to managed care firms and the determinants of their enactment.

Within this framework, providers may be, or not, allowed to balance bill patients, that is, they may charge, or not, an amount to consumers on top of the price received by the third-party payer. Balance billing has received some attention in the literature. Glazer and McGuire (1993) study the efficiency effects of physician fees under balance billing and compare the equilibria of monopolistically competitive physicians with and without balance billing. Finally, Zuckerman and Holahan (1991) analyze the effects of balance billing on the reform of physician payment. (See also comments by Hixson (1991)). Since balance billing in not crucial to our arguments, we assume it away. This assumption is also supported by its prohibition in several countries.

In a world of two providers, the set of possible decisions defines four different sub-games in prices, which in turn define previous-stage profits for providers. Therefore, we first characterize the four subgames. When both providers choose to join agreement, demand is split in half. Each provider receives price p. Profits earned are $\Pi_i = p/2,\ i = A, B$. In the other polar case of both providers choosing not to join the agreement, the market game is back to the Hotelling price game, given fixed locations. The symmetry of the solution implies equal demand to each provider and prices are, in equilibrium, $p_i = t$, $i = A, B$. Associated equilibrium profits are $\Pi_i = t/2$, $i = A, B$.

The last possible case has one provider joining the agreement and accepting to receive p, while the other stays out and sets freely its price. Without loss of generality, we assume provider A to join the agreement. Demand is defined by the location of the indifferent consumer, which is given by:

$$tx = p_B + t(1-x) \text{ or } x = \frac{1}{2} + \frac{p_B}{2t}.$$

Since providers are not allowed to balance bill patients, someone visiting provider A pays nothing while if he visits provider B pays the full price charged by the latter provider. The equilibrium price of provider B is $p_B = t/2$ and profits are $\Pi_B = t/8$ and $\Pi_A = 3p/4$.

The payoff matrix of the first-stage of the subgame is now given by Table 1.

A/B	Join	Not Join
Join	p/2 ; p/2	3p/4 ; t/8
Not Join	t/8 ; 3p/4	t/2 ; t/2

Table 1: Equilibrium profits.

For the outcome of both joining to be an equilibrium, it is necessary and sufficient that

$$\frac{p}{2} \geq \frac{t}{8} \text{ or } \frac{p}{t} \geq \frac{1}{4}.$$

On the other hand, for both providers to stay out of the agreement, we need to have $p/t < 2/3$. It is straightforward to check that there is no asymmetric equilibrium in pure strategies. The different possibilities can be traced in the (p, t) space as shown in Figure 1.

It is clear that there is a range of parameter values for which both equilibria may arise. We use Pareto dominance as selection criterion, which ensures that only one equilibrium is selected. Thus, the equilibrium where both providers join the agreement occurs for $p/t \geq 2/3$, as in the intermediate range it is dominated by the other equilibrium candidate.

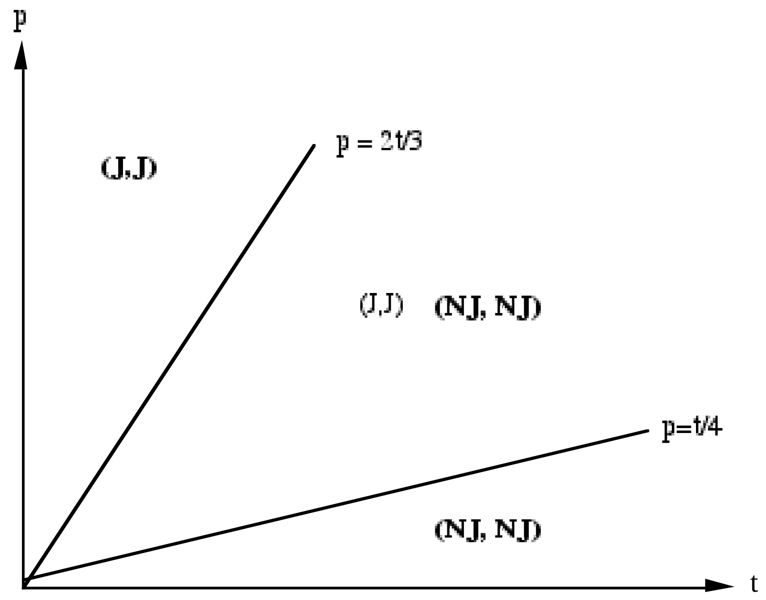

Figure 1: Equilibrium regimes.

Taking into account that the negotiation discussion we present in this paper is a subgame of a broader game, it is easy to recognize that in the equilibrium of that broader game we cannot have both providers not participating in the "any willing provider" contract. If this was the case, not insurance will be in fact delivered to consumers, and in anticipation of this, no insurance contract would be signed. This provides a clear rationale to impose in the remaining of our analysis that $p/t \geq 2/3$.

We take now the optimal choice of the price set by the third-party payer. The criterion is the minimization of total health expenditure. Given the initial assumption of full insurance, all expenses will be paid, irrespective of the provider chosen by each particular consumer. The optimal value of p to be announced in the "any willing provider" contract is the lower price that still allows for both providers accepting it. Thus, the optimal price is $p/t = 2/3$. This optimal price is also lower than t, which guarantees that the third-party payer prefers to announce "any willing provider" contracts instead of allowing free competition between the parties.

Three negotiation formats have been presented up to this point: separate bargaining, joint bargaining and any willing provider. It is now time to address the relative advantages of each negotiation process vis-a-vis the others.

4 The preferred negotiation format.

4.1 Joint vs. separate bargaining.

We can trace the comparison of joint and separate bargaining procedures in the space $(P, \tilde{R})$, where $\tilde{R} \equiv \widetilde{\Pi} + F$. Again, distinguishing between two different assumptions is of relevance.

Consider first the case where the third-party payer retains its bargaining power in the joint bargaining with respect to the separate bargaining. From the point of view of the third-party payer the joint bargaining is better than the separate bargaining. This is easily seen by taking the difference between profits:

$$\widehat{\Pi}_{JB} - \widehat{\Pi}_{SB} = \frac{\delta(1-\delta)}{2-\delta}\left(\widetilde{R} - \frac{t}{4}\right) \geq 0.$$

This difference is non-negative from the equilibrium condition for joint bargaining to yield an equilibrium surplus division.

Consider now the case where providers keep their bargaining powers. The difference in profits for the third-party payer is,

$$\widehat{\Pi}_{JB} - \widehat{\Pi}_{SB} = \left(\frac{t}{4} - \widetilde{R}\right)\frac{2(1-\delta)^2}{2-\delta} \leq 0.$$

This difference is non-positive again from the equilibrium condition for joint bargaining to yield an equilibrium surplus division. Thus, comparison of joint bargaining vs. separate bargaining hinges upon how the bargaining power of the third-party payer changes, relative to providers.

4.2 Joint bargaining, Separate bargaining and Any willing provider.

The comparison between a joint bargaining process and its alternatives (separate bargaining and "any willing provider" contracts) depends on who retains more easily the bargaining power when moving from separate to joint bargaining.

Consider first the case where the joint bargaining is better than the separate bargaining, (i.e. when the third-party payer keeps the bargaining power). From the point of view of the third-party payer, the joint bargaining procedure is better than “any willing provider” if

$$\widehat{\Pi}_{JB} - \widehat{\Pi}_{AWP} = p - \widetilde{P} = p - \left(\delta\frac{t}{4} + \tilde{R}(1-\delta)\right) > 0.$$

Similarly, the separate bargaining procedure, in the case it dominates joint bargaining (i.e. when providers keep their bargaining power), can be compared with the “any willing provider” procedure according to:

$$\widehat{\Pi}_{SB} - \widehat{\Pi}_{AWP} = p - \left(\frac{\delta t}{4(2-\delta)} + \tilde{R}\frac{2(1-\delta)}{2-\delta}\right) > 0.$$

These two conditions define two lines, as shown in Figure 2, which allow for a simple description of the basic economic intuition present.

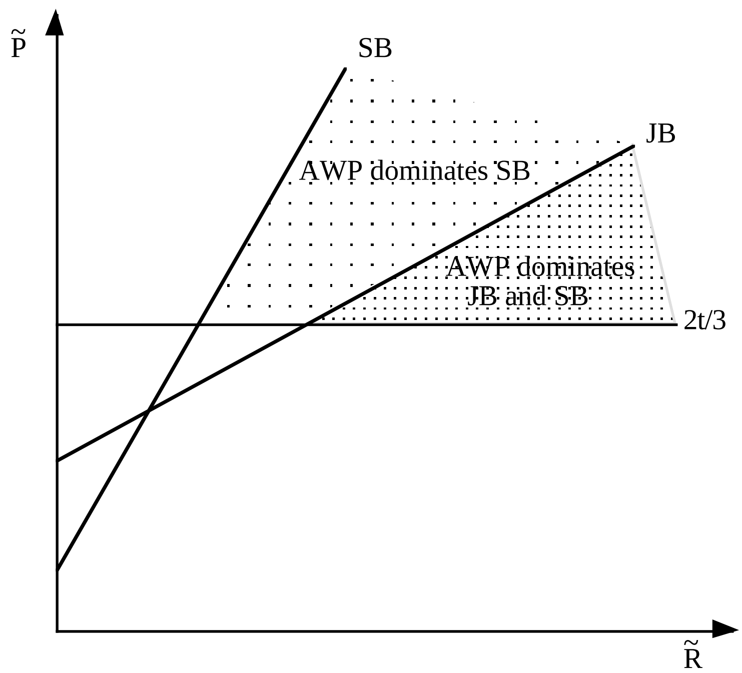

Figure 2: Optimal negotiation procedure.

Consider the case of joint bargaining. At the optimal price $p/t = 2/3$, we observe that for high values of $\widetilde{R}$, the any willing provider contract is preferred while for low values the ordering is reversed. This results from relatively simple forces. The intuition runs as follows. If $\widetilde{R}$ is small, there is not much surplus to bargain. Hence, prices will be below the price required in the any willing provider case to generate the acceptance outcome. The reverse occurs for high $\widetilde{R}$. Since the bargaining process transfers surplus, the any willing provider contract is equivalent to a "tough" bargaining position. The commitment to a price is more valuable when $\widetilde{R}$ is large.

It is easy to see that the same intuition applies to the comparison between separate bargaining and "any willing provider". More interesting is to note that the "any willing provider" contract dominates for a wider set of parameters in the case of separate bargaining. This is not surprising, as the separate bargaining procedure performs better, from the point of view of the third-party payer, than joint bargaining when putting the providers together makes the third-party payer less powerful. If this occurs, the "any willing provider" type of contract is a way to regain bargaining power.

5 A "pyramid" model.

In our two-provider world, it is never the case that one provider decides to join negotiations with the third-party payer, while the other provider remains outside any agreement. One may question whether this a general feature, or not. In particular, we want to address whether this is a matter of a small number of providers, or not. We are able to show that, in an extended model, there is no subset of providers which choose, in equilibrium, to remain independent. By independent we mean providers that do not negotiate prices with the third-party payer.

We consider a natural extension of our two-provider model: there are $\overline{n}$ providers in the market, each pair of providers is connected by a segment of length one of consumers (that is, total market size is $z = \overline{n}(\overline{n}-1)/2$.[3] Thus, every provider competes with every other one.

Since we are looking for an asymmetric equilibrium emerging from a symmetric starting point, two demand functions are crucial: the one faced by providers that decided to remain outside any negotiation (outsiders) and the demand faced

[3] We can, alternatively, fix market size at one. In this case, each segment linking any two providers has length $1/z$. It turns out that equilibrium conditions are exactly the same. For other applications of the pyramid model, see von Ungern-Stenberg (1991).

by providers that bargain with the third-party provider (insiders). Without loss of generality, we index insiders from 1 to n, and outsiders from $n+1$ to $\overline{n}$.

The demand faced by outsiders is:

$$D_i^{out} = \sum_{j=n+1, j\neq i}^{\overline{n}} \left(\frac{1}{2} - \frac{P_i - P_j}{2t}\right) + \sum_{j=1}^{n} \left(\frac{1}{2} - \frac{P_i}{2t}\right).$$

The total demand is composed by the usual Hotelling demand when the outsider provider faces another outsider plus the demand under zero price of the rival in the consumers' range it is competing with insiders.

Similarly, the insiders demand is:

$$D_i^{in} = \sum_{j=n+1}^{\overline{n}} \left(\frac{1}{2} + \frac{P_j}{2t}\right) + \sum_{j=1, j\neq i}^{n} \frac{1}{2}.$$

The first term is demand shared with outsiders, while the second term is the equal split of demand with other insiders. Let's take first the problem of outside providers. The profit function is:

$$\Pi_i^{out} = p_i D_i^{out}.$$

The first-order condition for profit maximization is:

$$\frac{\partial \Pi_i^{out}}{\partial p_i} = \sum_{j=n+1, j\neq i}^{\overline{n}} \left(\frac{1}{2} - \frac{P_i}{2t}\right) + \sum_{j=1}^{n} \left(\frac{1}{2} - \frac{P_i}{2t}\right) - \frac{\overline{n}-1}{2t} P_i = 0.$$

The resulting equilibrium price of outsiders (which does not depend on insiders' prices given the full insurance assumption) is:

$$P = \frac{\overline{n}-1}{\overline{n}+n-1} t.$$

The profit of an outsider provider, when there are $\overline{n}$ providers in the market and n of them choose to negotiate with third-party payers is:

$$\Pi^{out}(n) = \frac{t}{2} \frac{(\overline{n}-1)^3}{(\overline{n}+n-1)^2}.$$

We need now to characterize the negotiation process with the n inside providers. We assume, for the moment, that the third-party payer conducts a joint bargaining process. The optimal negotiated prices solve:

$$\max_{\{p_i\}}(\widetilde{R}-\sum_{i=1}^{n}\Pi_i)^{\delta}\prod_{i=1}^{n}\left(\Pi_i-\Pi^{out}(n)\right)^{(1-\delta)/n},$$

where $\widetilde{R}$ denotes the revenues from the insurer net of its fallback value.

The associated first-order condition is:

$$-\delta(\Pi_i-\Pi^{out}(n-1))+(\widetilde{R}-\sum_{i=1}^{n}\Pi_i)\frac{1-\delta}{n}=0,\ i=1,\dots,n.$$

Summing over all i,

$$-\delta\sum_{i=1}^{n}\Pi_i+\delta\sum_{i=1}^{n}\Pi^{out}(n-1)+(1-\delta)(\widetilde{R}-\sum_{i=1}^{n}\Pi_i)=0,$$

from which

$$\sum_{i=1}^{n}\Pi_i=(1-\delta)\widetilde{R}+\delta n\Pi^{out}(n-1).$$

Substituting back in provider i's first-order condition:

$$\Pi_i=\Pi^{out}(n-1)+(1-\delta)\Pi^{out}(n)+\widetilde{R}\frac{1-\delta}{n}.$$

Thus,

$$\Pi_i^{in}(n)=\Pi^{out}(n-1)+\frac{1-\delta}{n}\widetilde{R}-(1-\delta)\Pi^{out}(n-1)=\delta\Pi^{out}(n-1)+\frac{1-\delta}{n}\widetilde{R}.$$

For an equilibrium with non-empty sets of both insiders and outsiders, one need to have,

$$\Pi^{in}(n)\geq\Pi^{out}(n-1),\quad\text{and}$$
$$\Pi^{out}(n)\geq\Pi^{in}(n+1).$$

That is, neither insiders nor outsiders want to change their decisions. The first condition can be rewritten as,

$$\frac{\widetilde{R}}{n}-\Pi^{out}(n)\geq 0,\quad\text{or}\quad\widetilde{R}\geq\frac{n(\overline{n}-1)^3t}{2(\overline{n}+n-1)^2},$$

while the second condition can be simplified to,

$$\frac{\widetilde{R}}{n} - \Pi^{out}(n) \leq 0, \quad \text{or} \quad \widetilde{R} \leq \frac{(n+1)(\overline{n}-1)^3 t}{2(\overline{n}+n)^2}.$$

Define,

$$K(x) = \frac{n+x}{(\overline{n}+n+x-1)^2}.$$

For the above conditions to define a proper interval for R, it is required that $K(0) < K(1)$. It is straightforward to check that $\dfrac{\partial K}{\partial x} < 0$, which means that no equilibrium with non-empty sets of both insiders and outsiders exist. Hence, the only equilibrium configurations are either all providers as insiders or all providers as outsiders.

To obtain an all-inclusive equilibrium, the equilibrium profits of each provider must be greater than the profits of being the first outsider, and the surplus for the third-party payer must be positive.

The profit of the first outsider is given by,

$$\Pi^{out}(\overline{n}-1) = \frac{t}{8}(\overline{n}-1).$$

According to the conditions mentioned above, $\Pi^{in}(\overline{n}) \geq \Pi^{out}(\overline{n}-1)$ requires

$$\widetilde{R} \geq \frac{t}{8}(\overline{n}-1)\overline{n}. \tag{1}$$

The equilibrium price obtained after solving the first-order condition of the problem describing the negotiation process yields,

$$P = \delta\frac{t}{4} + (1-\delta)\frac{2\widetilde{R}}{\overline{n}(\overline{n}-1)}.$$

The third-party payer obtains a non-negative surplus if $\widetilde{R} - \overline{n}\Pi^{in}(\overline{n}) \geq 0$, which boils down to the condition (1) above. Thus, if condition (1) is met, all providers are insiders.

We summarize our discussion in the following proposition.

Proposition 3. *Under joint bargaining, the equilibrium has all providers accepting the agreement iff*

$$\widetilde{R} \geq \frac{t}{4}\frac{\overline{n}(\overline{n}-1)}{2}.$$

The associated equilibrium price is,

$$P = \delta \frac{t}{4} + (1-\delta) \frac{2\widetilde{R}}{\overline{n}(\overline{n}-1)}.$$

This proposition extends naturally our previous result (note that for $\overline{n} = 2$, we recover the conditions in the previous section).

We now proceed to derive implications of the use of “any willing provider contracts” in the ”pyramid” model. The crucial conditions to be satisfied to reach an equilibrium with a partition of providers into those associated with the third-party payer and independent providers are,

$$\Pi^{in}(n) \geq \Pi^{out}(n-1), \quad \text{and}$$
$$\Pi^{out}(n) \geq \Pi^{in}(n+1).$$

Assuming that balance billing is not allowed, the relevant profit functions are:

$$\Pi^{in}(n) = \frac{p(n-1)}{2} + (\overline{n}-n)p\frac{3}{4},$$
$$\Pi^{out}(n) = \frac{nt}{8} + (\overline{n}-n-1)\frac{t}{2}.$$

Defining $\tilde{p} = p/t$, is is straightforward to write the above conditions as:

$$n(3-2\tilde{p}) \geq \tilde{p}(4-6\overline{n}) + (4\overline{n}-1), \quad \text{and}$$
$$n(2\tilde{p}-3) \geq (\overline{n}-1)(6\tilde{p}-4).$$

These conditions lead to the following proposition.

Proposition 4. *The equilibrium has all providers choosing either to accept the “any willing provider” contract proposed or to reject it. More precisely,*

for $\tilde{p} \geq 2/3$, *all accept*

for $\tilde{p} < 2/3$, *all reject*.

Proof. The conditions to be satisfied can be expressed in terms of two basic magnitudes:

$$n^* = \frac{(\overline{n}-1)(6\tilde{p}-4)}{2\tilde{p}-3},$$
$$n^{**} = \frac{1-4\tilde{p}+\overline{n}(6\tilde{p}-4)}{2\tilde{p}-3}.$$

The first point to note is that $\Delta n = n^{**} - n^* = 1$. Thus, there is only one integer value n between n^* and n^{**}. We now show that it is not possible to have some providers choosing to be in the agreement and the remaining ones choosing to be independent, that is, we cannot have a mixed equilibrium.

Take first $2\tilde{p}-3 \geq 0$. The conditions for a mixed equilibrium are $n \leq n^{**}$ and $n \geq n^*$. It must also be the case that $n^{**} > 0$ and $n^* < \overline{n}$ for feasibility of the solution.

For $n < \overline{n}$ to be satisfied,

$$(\overline{n}-1)(6\tilde{p}-4) < \overline{n}(2\tilde{p}-3),$$

or

$$\overline{n} < \frac{6\tilde{p}-4}{4\tilde{p}-1} \equiv \varepsilon(\tilde{p}).$$

As $\partial\varepsilon/\partial\tilde{p} > 0$ and $\arg\min_{\tilde{p}} \varepsilon(\tilde{p}) = 3/2, \overline{n} < \varepsilon(3/2)$ is a necessary condition. This implies $\overline{n} < 1$, which is not feasible. Hence, we cannot have a mixed equilibrium for $\tilde{p} > 3/2$.

Take now $2\tilde{p} < 3$. The conditions to be satisfied for a mixed equilibrium are $n \geq n^{**}, n \leq n^*$. Since $n^{**} = n^* + 1$, this is not a well-defined interval. No equilibrium value for n exists.

We show next under what conditions all providers either accept or reject the proposed "any willing provider" contract.

The condition for all providers to accept is given by:

$$\Pi^{in}(\overline{n}) \geq \Pi^{out}(\overline{n}-1),$$

or

$$p\frac{\overline{n}-1}{2} + (\overline{n}-\overline{n})\frac{3}{4} \geq (\overline{n}-1)\frac{t}{8} + (\overline{n}-n+1-1)\frac{t}{2},$$

which becomes $\tilde{p} \geq 1/4$. Thus, for prices above this threshold all providers accept the "any willing provider" contract.

The condition for all providers to reject the contract proposal is,

$$\Pi^{out}(0) \geq \Pi^{in}(1),$$

or

$$\tilde{p} \leq 2/3.$$

Now, for $2/3 \geq p \geq 1/4$ both equilibria are possible. As in the two-provider case, we appeal to the concept of Pareto dominance to select one of the two possibilities.

Equilibrium profits when all providers accept the contract are,

$$\Pi = (\overline{n} - 1)\frac{p}{2}.$$

On the other hand, when all providers stay out, the equilibrium profits are,

$$\Pi = (\overline{n} - 1)\frac{t}{2}.$$

It is straightforward to see that for $\tilde{p} \leq 2/3$, profits of not accepting are always higher.

Summarising, the equilibrium characterisation, under the criterion of Pareto dominance, is

– all providers accept the contract, $n = \overline{n}$ for $\tilde{p} \geq 2/3$;

– all providers reject the contract, $n = 0$ for $\tilde{p} < 2/3$.

The equilibrium price to be set by the third-party payer is $\tilde{p} = 2/3$. Higher prices do not increase the set of providers, but it means higher payments. Lower prices lead to exit of all providers. □

This proposition shows that, under the "any willing provider" contract, either all providers join the network or none does. There exists a threshold price above which all providers accept the contract proposed by the third-party payer.

We cannot make a direct comparison with joint bargaining outcome, since the equilibrium price in the latter negotiation process is not explicitly determined in our analysis. The equilibrium price depends on the objective function of the third-party payer. In particular, it will depend on the penalties suffered by the third-party payer whenever a provider does not join the agreement. These can include both monetary and non-monetary aspects (like reputation, value of variety and freedom of choice to consumers, etc . . .).

A final question to be addressed is whether the increase in the number of providers does change the relative attractiveness of joint bargaining vs. any willing provider contracts. The crucial comparison to be made is between,

$$P = \delta \frac{t}{4} + (1-\delta)\widetilde{R}\frac{2}{\overline{n}(\overline{n}-1)}$$

and

$$P = \frac{2t}{3}.$$

Defining the comparison in per capita terms, noting that $\overline{n}(\overline{n}-1)/2$ is the total number of consumers served, we see that if the reference value $\widetilde{R}$ adjusts exactly such as to keep the per capita value constant, then increasing the number of providers does not change the relative attractiveness of any willing provider contracts vis-a-vis joint bargaining.

This will be the case if when losing one provider the third-party payer receives zero surplus. Then $\widetilde{R}$ equals premium revenues. Since consumers are ex-ante identical (an implicit assumption in our model), the premia revenue are just a fixed premia times the number of consumers.

However, a zero surplus when just one provider defects from the agreement may seem to extreme. Another possible assumption is to take a fixed penalty F for each provider that leaves the negotiation, independent of the total number of providers and of how many providers still remain in the agreement. In this case, we can provide some further structure to the problem. The reference value $\widetilde{R}$ is defined by

$$\widetilde{R} = F + (\overline{n}-1)\Pi^{in}(\overline{n}-1),$$

and

$$\Pi^{in}(\overline{n}-1) = \Pi^{out}(\overline{n}-2)\delta + (1-\delta)\frac{\widetilde{R}}{\overline{n}-1},$$
$$\Pi^{out}(\overline{n}-2) = \frac{t}{2}\frac{(\overline{n}-1)^3}{(2\overline{n}-3)^2}.$$

Solving for the equilibrium value of $\widetilde{R}$, holding F constant, we obtain

$$\widetilde{R} = \frac{F}{\delta} + \frac{t(\overline{n}-1)^4}{2(2\overline{n}-3)^2}.$$

Substituting back into the per capita spending (equilibrium price) in the joint bargaining situation,

$$P = \delta\frac{t}{4} + \frac{1-\delta}{\delta}F + (1-\delta)tQ(\overline{n}),$$

where

$$Q(\overline{n}) = \frac{(\overline{n}-1)^3}{\overline{n}(2\overline{n}-3)^2},$$

and

$$\frac{\partial Q}{\partial \overline{n}} = -\frac{3(\overline{n}-1)^2}{\overline{n}^2(2\overline{n}-3)^3} < 0.$$

Thus, an increase in the total number of providers leads, in this case, to being less likely for any willing provider contracts to dominate. This is so because the equilibrium price will be lower the higher the number of providers. In terms of Figure 2, this means that the line JB rotates downwards around its intercept with the $\widetilde{p}$ axis. Moreover, the equilibrium price under joint bargaining is,

$$\lim_{\overline{n}\to\infty} P = \frac{t}{4} + \frac{1-\delta}{\delta}F,$$

which can be smaller or greater than $2t/3$ depending on the penalty F. Thus, in general, the intuition of the two-provider case caries over to any number of providers.

6 Final remarks.

In this paper, we address a simple question: what negotiation procedure should a third-party payer select when contracting health care providers? Three alternatives, commonly observed, have been considered assuming a simultaneous negotiation: separate bargaining, joint bargaining and "any willing provider" contracts.

In separate bargaining, the third-party payer negotiates with each provider in an independent way; joint bargaining means that a simultaneous bargaining with all providers is implemented; finally, the "any willing provider" procedure consists in a price announcement by the third-party payer . Providers willing to take such price are free to join the contract. The assumption of a simultaneous negotiation process is justified by the transaction costs associated with the negotiations. If such transaction costs are of a fixed nature (that is, they do not depend on the particular outcome of each negotiation and are independent of the particular procedure selected), than a simultaneous bargaining approach will be preferred. Sequential bargaining procedures can, on the other hand, offer some advantages due to the strategic elements involved. A full exploration of benefits and costs of sequential bargaining approaches is left for future research.

The main findings of the analysis are the following. Superiority of a joint bargaining procedure relative to an independent bargaining approach hinges upon how bargaining power is distributed. This accords with intuition. More interesting is the comparison of either joint or separate bargaining approaches with the "any willing provider" contracts. Whenever the surplus to be shared in the bargaining is relatively high, the third-party payer prefers the "any willing provider" system. This is so because the simple price announcement constitutes an implicit commitment to be tough. This commitment is more valuable in the case of a bigger surplus. It is also possible to state that the "any willing provider" contract dominates more easily the separate bargaining procedure than the joint bargaining approach (under the assumption that the third-party payer keeps the bargaining power in both situations). The reason is that under joint bargaining, the grouping of providers makes the third-party payer relatively stronger when compared with individual negotiations with each provider. Therefore, the third-party payer is able to extract a higher share of the surplus and the commitment value of the "any willing provider" contract is less important.

Although most of the analysis has been done considering two providers only, we can extend the same arguments to an arbitrary number of providers. Moreover, under the symmetry assumptions used, the possible equilibria with an arbitrary number of providers are characterized either all providers joining the agreement with the third-party payer, or none accepting the proposal of the third-party payer.

Some caveats to the model deserve discussion. The first one is the symmetry across providers. We conjecture that introducing asymmetries across providers, be it in the bargaining power vis-a-vis the third-party payer , or in the production costs of health care services, will not change the qualitative results, especially if price discrimination by the third-party payer across providers is not feasible. This seems to be, in general, the case. Payments to providers can differ according to patient characteristics but not according to providers' efficiency level. Of course, some exceptions exist (for example, high reputation doctors may be able to obtain a better value for consultation).

Second, we conjecture that the introduction of asymmetries would allow us to obtain equilibria characterized by some providers being associated with the third-party payer , while others remain independent. Once again, we believe the relative advantages and costs of the different bargaining procedures to still be present.

The third issue is quality. We have assumed away quality considerations. Thus, our analysis applies to the provision of services where quality can be easily monitored, or does not have a major impact on patients' selection of provider. Again, we conjecture that the essential trade-off in choosing between "any willing provider" contracts or an explicit bargaining procedure would remain. Quality differences shift demand towards one of the providers, it would not change the incentives of the third-party payer to choose one of the bargaining procedures proposed.

The analysis renders some testable predictions. The simplest one to put to test is that whenever a high surplus to be shared exists, one should be observe more frequently "any willing provider" contracts. Another one is that the number of providers should not have an impact on the selection of the bargaining procedure as long as the surplus per patient treated is kept constant. If the per capita surplus grows (decreases) with the number of providers in the market, then one should observe "any willing provider" more (less) often. It is beyond the scope of the paper to empirically test these implications. This is left for future research.

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