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Bargaining and idle public sector capacity in healt care

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Abstract

A feature present in countries with a National Health Service is the co-existence of a public and a private sector. Often, the public payer contracts with private providers while holding idle capacity. This is often seen as inefficiency from the management of public facilities. We present here a different rationale for the existence of such idle capacity: the public sector may opt to have idle capacity as a way to gain bargaining power vis-à-vis the private provider, under the assumption of a more efficient private than the public sector.

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1. Introduction.

A feature present in countries with a National Health Service is the co-existence of a public and a private sector. Often, the public payer contracts with private providers while holding idle capacity. This is often seen as inefficiency from the management of public facilities.[1] We present here a different rationale for the existence of such idle capacity: the public sector may opt to have idle capacity as a way to gain bargaining power vis-à-vis the private provider, under the assumption of a more efficient private than the public sector.

2. The model.

We consider a setting where a third-party payer, say a National Health Service (NHS), has to negotiate prices of health care services with providers. We assume, for the moment, zero production costs in the provision of health care and the existence of two providers. We assume away capacity constraints in provision in the private sector. The public sector may, or may not, be capacity constrained. Both situations will be treated below.

Price negotiation is carried out under the assumption that providers join a sectoral or professional association.[2] The association negotiates the price with the NHS. The negotiation outcome is described by the Nash bargaining solution. In the case of failure to reach an agreement, both providers compete in the market. Competition takes place on price. Since we consider cases where demand is essentially exogeneous and has to be fully satisfied, this is a more natural assumption than quantity competition.[3] We assume providers to be characterized by horizontal product differentiation as perceived by the consumer. Differentiation can be

[1] For a review of several countries, see Busse and Howorth (1999), Crainich and Closon (1999), Engelbert (1999), Lancry and Sandier (1999), for example.

[2] A discussion of alternative assumptions can be found in Barros and Martinez-Giralt (2004a, b).

[3] We assume that even in the presence of an association, providers do not collude. We will discuss this assumption later.

due to geographical distance and/or subjective preferences of the consumer, for example. This means that we model market interaction as a Hotelling product differentiation situation. Providers are located at the endpoints of a segment [0,1]. Patients are uniformly distributed along the line, with unit mass.

Consumers are insured and face a copayment rate s. This assumption is innocuous for the analysis. Actually, all the qualitative results hold for any value $s \in (0, 1)$. Note that $s = 1$ implies no insurance to patients, which would be contradictory with the role of the third-party payer.

The NHS has a budget M from which it must pay providers. Having free funds is positively valued by the NHS as it allows for its productive application elsewhere in the health sector. The gain to the NHS from the negotiation is given by the difference in the net surplus under negotiation and in the case of failure. We denote by R such value net of the fallback value. In our simple model, given the assumption that a positive level of insurance coverage is always guaranteed to patients, it will be the payment to be made by the NHS to ensure provision in the private market plus the value, in monetary terms, of the extra insurance level provided to patients (a copayment s).[4]

We assume profits of both providers to be equally weighted in the objective function of the association. An alternative assumption would be to assume that the more efficient provider has a larger influence in the association's objectives. This would leave the qualitative results unchanged, as it would fall between our two polar cases.

The setting we have in mind has a first-stage with the public sector decides its capacity and a second stage, in which price bargaining occurs. The model is solved, as usual, by backward induction.

Before introducing the role of capacity, we need to detail a couple of relevant

[4]See Barros and Martinez-Giralt (2004a) for a formal derivation.

values. Denote by $\Pi_i, i = A, B$ the profits of each provider and by $\bar{\Pi}_i; i = A, B$ in the case of negotiation failure. Profits are then given by

$$\Pi_A = xp_A, \qquad \Pi_B = (1-x)p_B,$$

where $p_i, i = A, B$, is the price received by each provider and x is the patient indifferent between providers A and B. This indifferent patient is defined by,

$$x = \frac{1}{2} - \frac{s(p_A - p_B)}{2t}.$$

Parameter t reflects product differentiation, and it is modeled as the (linear) "transport cost" of not consulting the most preferred type of provider.[5]

Let $\mu > 0$ be the marginal cost of treatment in the public sector.[6] In the absence of capacity constraints and equal efficiency in public and private facilities, only public sector treatment would be provided by the third-party payer. For the problem to be interesting from an economic perspective, we introduce the assumption of a less efficient public sector. The two-stage game is solved by backward induction.

Let κ be the capacity installed and m the capacity used, $m < \kappa$. The cost of capacity building is $\phi(\kappa)$, increasing and convex in κ. We consider a population of patients with size 1. Whenever $\kappa > m$ in equilibrium, we say that the public sector is not capacity constrained.

The net surplus for the providers is given by the difference of serving $(1 - m)$ patients at the agreed price p and serving $(1 - \kappa)$ at the free private market equilibrium price. On the third-party payer side, the surplus from the agreement is given by

$$M - p(1-m) - \mu m \tag{1}$$

[5] See a textbook treatment such as Tirole (1988).

[6] As the marginal cost of treatment in the private sector is zero by normalization, μ is best viewed as the difference in efficiency between private and public practice.

as m patients are treated in the public sector at cost μ and the remaining are treated in the private sector at price p. If negotiations fail, the fallback value of the third-party payer is:

$$M - \tilde{p}(1-\kappa)(1-s) - \kappa\mu \tag{2}$$

where $\tilde{p}$ is the price paid by the patients that exceed public sector capacity, of which the third-party payer reimburses a fraction $1-s$. Thus, the price from the second-stage bargaining problem solves

$$\begin{aligned} \max_p \Omega &= (\mu\kappa + (1-\kappa)(1-s)\tilde{p} - m\mu - (1-m)p)^\delta \times \\ &\quad \times ((1-m)p - (1-\kappa)\tilde{p})^{1-\delta} \end{aligned} \tag{3}$$

Note that the bargaining procedure, in this particular case, divides between the providers and the third-party payer the cost savings from producing in the private sector, $(\kappa - m)\mu$, minus the cost-shifting to patients in case of negotiations failure, $s(1-\kappa)\tilde{p}$.

Solving for the equilibrium price yields:[7]

$$p = (1-\delta)\frac{\kappa - m}{1-m}\mu + \frac{1-\kappa}{1-m}\tilde{p}(1-(1-\delta)s) \tag{4}$$

The value of $\tilde{p}$ is given by the private market equilibrium when patients pay a fraction s of the price. Thus, $\tilde{p} = t/s$.

We now consider the first stage, the capacity installed and its utilization. These decisions take into account the continuation of the game, and how the negotiated price will be affected by them.

The objective function of the third-party payer is the surplus generated, taking into account the game continuation:

$$S = M - m\mu - (1-m)p(\kappa, m) - \phi(\kappa) \tag{5}$$

[7] In addition, we must require that each player has a positive gain from engaging in the negotiation. This requirement implies $\mu(k-m) - (1-\kappa)s\tilde{p} > 0$.

where p is the equilibrium price of the negotiation stage, and therefore depends on both κ and m. It turns out that

$$\frac{\partial S}{\partial m} = -\mu\delta < 0 \tag{6}$$

Hence, the optimal capacity utilization is, in this case, zero. On the other hand,

$$\frac{\partial S}{\partial k} = [\delta\tilde{p} - (1-\delta)(\mu - \tilde{p}(1-s))] - \phi'(\kappa) \tag{7}$$

Whenever the term in square brackets is positive, there will a positive equilibrium value for capacity, which will be kept idle. The only reason to build capacity here is the strategic effect associated with the negotiation stage. Increasing κ reduces the fallback value of the providers, valued at the margin by $\tilde{p}$. This helps in obtaining a lower price in the negotiation stage. On the other hand, it may reduce or increase the fallback value of the third-party payer, as it depends on whether using the extra capacity costs more than using the private market. That is, if $\mu > (1-s)\tilde{p}$, the third-party payer would prefer to buy in the private market.[8] Each of these marginal changes in the fallback values resulting from capacity decisions are weighted by the bargaining power of each side. Of course, if the cost difference between public and private treatment is sufficiently high, the optimal capacity may well be zero in the public sector, and there will be a capacity constraint. However, the important point we want to convey is that the public sector may choose to have slack as a way to improve its negotiation terms. Naturally, this only has value if there is some gain from using the private sector vis-à-vis public facilities.

3. Concluding remarks.

We showed, in a very simple model, that idle capacity in public sector health care provision may have a economic rationale: increasing bargaining power against

[8]We assume that it is credible that in case of negotiations failure, the public sector will use all its capacity. If this was not the case, the only equilibrium price would be the private market equilibrium price.

private providers that contract with the public payer. The argument is akin to the Dixit-Spence excessive capacity result, where a firm builds extra capacity as a commitment to be aggressive in the market.[9]. The idle capacity works as a commitment to extract more surplus from more efficient private providers that negotiate prices with the public payer. Therefore, empirical assessments of the role of idle capacity in the public sector must take into account whether negotatiations with the private sector exist.

[9] Dixit (1979, 1980), Spence (1977, 1979)

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