The Organisation of Government Bureaucracies: The Choice between Competition and Single Agency*

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Abstract

Recent reforms of public sector welfare provision have introduced competition between public sector suppliers. In this paper we analyse when a self-interested politician will introduce competition. Professionals who supply welfare services receive a private benefit from working but may put different weighting on the types of customers from their proportions in the population. When public suppliers have to compete for contracts the level of effort is increased. More importantly, the balance of effort is altered. Competition forces professionals to allocation of effort that better represents the proportions in the population. However, competition will also be more expensive than a single public supplier as a result of the increase in quality. A self-interested politician will choose competition only if these additional costs are outweighed by the benefits.

1 Introduction

The past 15 years has seen widespread reform of the production of services by government. Where consumers pay directly for the goods or services, reform has often taken the form of privatisation. But reforms have also been introduced where the finance for the service remains public, for example in health, education and local government services. One common type of reform of these services is the introduction of internal or 'quasi-markets'. These reforms have two key elements. The first is separation of the production of the service from its financing. The second is creation of structures to allow competition between public suppliers of services (Le Grand 1991).

The services where quasi-market reforms have been introduced share certain key features. First, a mixture of market failure and equity concerns means finance is predominantly from the public purse, so responsibility for finance remains with politicians. Second, the suppliers of the service tend to be professionals: doctors, teachers, social workers. Professionals may derive benefit from providing services as part of their job satisfaction or for career concerns. But they may also value different aspects of service provision differently to the general population. Doctors may not be very interested in the provision of routine services, but more interested in innovative services. On the other hand, most of the population require routine services, rather than innovation. Third, the output of these providers is generally unverifiable, even if it may be observed. A consumer may know whether her operation worked, but generally she cannot exactly measure the value added by the service provider. Fourth, consumers of these services are heterogeneous, and benefit from services to a different amount.

Reforms are introduced by politicians. This paper considers why a self-interested politician would seek to replace a single public supplier with provision by competing public suppliers[1]. We focus on a specific case: the introduction of competition under arrangements where competing suppliers of services cannot select consumers, but must serve all those allocated to them by the purchasing authority. We allow the suppliers' weighting of the

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[1]Shleifer and Visnhy (1994) and Boycko *et al* (1996) analyse privatisation decision of a self-interested politician.

benefit of serving the different types in the population to differ from that of the demanders of the service.

We find the introduction of competition for contracts induces suppliers to increase effort. In addition, they will alter the balance of their effort towards those services favoured by the politician and away from those they get most private reward from. This will increase political benefit. But competition will also be more expensive than a single supplier as result of the increase in effort spent on improving quality. This will raise taxes and increase political costs. A self-interested politician will choose to introduce competition only if these additional costs are outweighed by the benefits.

Despite a widespread interest in increasing the role for incentives in public sector organisations there has been little formal analysis of the introduction of competition within government. But there is a growing literature which asks how ownership structure can provide incentives to which the present paper is related. In common with these papers we take an the incomplete contracting perspective of Grossman and Hart (1986) and Hart and Moore (1990). Hart *et al* (1997) examine the choice between public and private suppliers in welfare services while our focus is on public suppliers. In a related paper Bolton and Xu (1999) analyse the effects of competition in an incomplete contracts framework. Their paper considers competition between employees both within and between firms. In contrast, our paper analyses competition in the product market.

The present paper is also close to the literature on principal-agent models where agents have multiple tasks. Holmström and Milgrom (1991) show how incentive pay serves to direct the allocation of the agents' effort. They show that a fixed wage can be optimal if some aspects of performance are unmeasurable and the agent is indifferent between types of effort. In those circumstances high-powered incentives would lead the agent to concentrate on the measurable tasks and to ignore the unmeasurable aspects. In this paper, we also assume that the agents like working, but do not assume that the agents are indifferent between types of tasks. Our model also differs from Holmström and Milgrom in that we assume that the average value of the service is not verifiable although it is observable. Observability of the average value is enough for competition to provide incentives while for variable wage to be used the values of different tasks have to be verifiable.

The present paper examines health care, and there is a large literature on contracting in health care. But it focuses not on institutional design, but on the issue of unobservability of quality of care and its implications

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for contract design. Where patients observe quality, patient demand can be used in conjunction with a mixture of cost based and prospective payments to induce the appropriate level of quality (e.g. Ellis and McGuire 1986). Ma (1994) shows that under certain conditions prospective payments can achieve both efficient quality and efficient effort to reduce costs. Chalkey and Malcomson (1998a) have extended this literature to the specific setting of the UK quasi-market reforms in health care. They show that a fixed price contract can induce a hospital to treat the number of patients a government buyer (purchaser) wants treated at any quality level the purchaser wants and with efficient effort to reduce costs without direct monitoring of costs and effort, provided quality has only one dimension and that it is possible to monitor both the actual number of patients treated and those waiting for treatment at a single supplier. Chalkey and Malcomson (1998b) show that where patients and purchasers do not have the same ranking of dimensions of quality, such a contract will not necessarily achieve both efficient quality and effort.

Our approach is rather different. We assume a fixed price contract and focus on the impact of competition on the quality and mix of services delivered in a situation where the purchaser buys for heterogeneous consumers on the basis of the value of the service to the consumer. We assume the purchaser acts as a perfect agent for the consumer, and that the budget is endogenous and determined by the quality of the care delivered by the supplier of care. It is the politician who cares about the net benefits, in other words, both the quality of service provided to each type of consumer and its cost.

The organisation of the paper is as follows. The next section outlines the UK National Health Service quasi-market reforms. The third section presents the model. The fourth section examines service provision without competition while the fifth section concentrates on competition. The sixth section analyses the optimal institution. The seventh section examines whether incentives can be improved by allowing more complex pricing arrangements. The final section concludes.

2 Quasi-market reforms

Prior to the late 1980s the in-kind benefits - health care, education, social services and social rented housing - of the UK (and several other European) welfare states were funded through taxation and delivered by service providers

who were part of either a central or a local government department. In the UK, each service provider was responsible for all services delivered in a local region. Service users had little or no choice of service provider as the local provider served its local population[2]. Standards for service provision and for service inputs were determined by the central government ministry responsible for provision of the service with some local political control. Monitoring of service providers was primarily on the basis of use of inputs, or in some case throughputs e.g. number of teachers employed and number of episodes of treatment given.

Such arrangements were criticised for being unresponsive to service users and inefficient. The UK government in the late 1980s introduced a set of reforms which took similar forms across the different services, and have been followed in other countries, particularly in health care. These 'quasi-market' reforms maintain tax finance, but change the form of service provider and the link between funding and provision. Service funding is separated from service provision. We focus here on the quasi-market for health care, but many of the features are common to other quasi-markets.

2.1   The quasi-market health care reforms

The reforms defined organisations responsible for buying the service. These 'purchasers' are allocated tax funds on the basis of need (primarily demographic characteristics) by government. The purchasers buy services for all users who fall within their geographical jurisdiction[3]. Competition for the purchaser function was not part of the reform package. Purchasers may buy services from whichever suppliers they wish to contract with (including those in the private sector). Purchasers must contract for health care for all the population they are responsible, and may not select their populations on the basis of risk. In other words, they must buy care for a heterogeneous set of service users.

The previous monopoly suppliers were broken up into stand-alone entities within the public sector. Their funding no longer comes direct from

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[2]There are some minor exceptions: for example, in primary health care the user had limited choice of family doctor; in education parents had some choice over schools in the catchment area in which they lived.

[3]A subset of purchasers were primary care physicians who covered all their patients. Since there is little competition between physicians for patients, essentially the patient group is predetermined by geography.

the central ministry but is determined by contracts won from purchasers. As purchasers are not restricted in their choice of supplier, competition has been introduced on the supply side (Propper 1996). As location is an important component of health care, competition is between a limited number of providers.

The reforms have given managers of hospitals greater control rights than under the previous arrangements. Direct local political control of hospitals has been reduced and politicians have stressed that the responsibility for local services rests with local purchasers and providers. But while management were given greater control rights over inputs, outputs, and pay, the ownership of the physical assets which they use remains in the public sector[4]. Managers are subject to central ministry scrutiny of investment decisions and control on access to capital markets. Control over cash flows between financial years is retained by central government and public suppliers are required to break-even each year. The reforms therefore can be viewed as similar to the corporatisation element of privatisation programs: ownership of the asset remains with the government, but managers have greater control rights.

Within a hospital, health care services are delivered by professionals, and service quality is an important dimension of the good being delivered. Quality is also important to the service user and to the politician who is responsible for service delivery in a tax funded system. However, the quality dimensions that are valued by service providers may not be the same as those valued by users or their elected representatives. Service providers have their own professional norms: career advancement is often made according to these norms rather than those held by service users or politicians. For example, the longest waiting lists in the UK are for services which are viewed as routine and without prestige by the medical profession, such as hip replacements, cataract surgery (Cullis *et al*, forthcoming) while politicians and the general public view waiting lists for such common interventions as one of the biggest problems in the UK health service. In introducing the quasi-market reforms, politicians in the UK and elsewhere have stressed that one aim is to increase the responsiveness of the service to the needs of patients: to introduce incentives to alter the service mix towards those services rated

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[4]The UK government has sought to increase private sector finance in education and health care, but controls on the use of this finance are very strict and the levels very small in relation to public sector investment.

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highly by users.

3　The model

There are two suppliers (hospitals), 1 and 2, each run by a manager. There are two types of customers, A and B (e.g. ordinary and unusual illnesses). Proportion γ of the population are of type A, proportion $(1 - \gamma)$ of type B. Type A is majority, $\gamma \geq \frac{1}{2}$.

The value of the supplier's service to the customers depends on the effort, e_i^k $i = 1, 2$, $k = A, B$, the manager (M) exerts. $e_i^k \in [0, E]$. The value is:

$$
\begin{aligned}
v_i^A &= e_i^A \text{ for type A and} \\
v_i^B &= e_i^B \text{for type B.}
\end{aligned}
$$

Effort is unobservable and costs $C\left(e_i^A, e_i^B\right)$. We assume that C_A, $C_B > 0$, $C_{AA}, C_{BB} > 0$, $C_{AA}C_{BB} > (C_{AB})^2$, $C_i(0,0) = 0$, $C_i(E, E) \to \infty$ for $i = A, B$ and subscripts denote first and second derivatives.

M is assumed risk neutral. In addition to the monetary wage, w_i, she receives a private benefit from the value of the service:

$$
B\left(v\left(e_i^A\right), v\left(e_i^B\right)\right) = \mu_A e_i^A + \mu_B e_i^B
$$

where $\mu_A + \mu_B = \mu$ and $0 \leq \mu \leq 1$. Private benefit can be interpreted as a formalisation of job satisfaction. Parameter μ denotes the level of professionalism. M is a professional who enjoys her work but may put different weights on the types from the population proportions. In particular, M may enjoy treating unusual cases (within a certain illness type) more than the ordinary ones. In this case $0 \leq \frac{\mu_A}{\mu} < \gamma$. However, we do not restrict $\frac{\mu_A}{\mu}$ to be lower than γ, so our analysis applies to any preferences of M. Private benefits can alternatively be interpreted as arising from career concerns. Success in unusual cases may be important for career concerns.

The outside wage for M is zero and therefore she is willing to participate for any nonnegative utility. M's utility is:

$$
U_i = w_i + B\left(v\left(e_i^A\right), v\left(e_i^B\right)\right) - C\left(e_i^A, e_i^B\right)
$$

We assume a Hotelling model where the two suppliers are located at the extremes of the unit interval $[0, 1]$. Supplier 1 is located at 0 and supplier 2 at

1. The customers of each type are uniformly distributed with density one on the unit interval. A customer of type k located at $0 \leq x \leq 1$ receives utility $v_1^k - tx$ if she is supplied by 1 and utility $v_2^k - t(1-x)$ if she is supplied by 2. We can think of the transportation cost as either literally the cost of transportation between different geographical locations or of representing different tastes. Each supplier has a capacity of one.

Since our analysis concentrates on the quality of the service we assume for simplicity that the production costs are zero.

Politician (P) receives a noncontractible political benefit which depends on the average value of the service

$$P\left(\gamma q_1 v_1^A + \gamma q_2 v_2^A + (1-\gamma) q_1 v_1^B + (1-\gamma) q_2 v_2^B\right)$$

where q_i is the quantity supplied by supplier i. Since we have a symmetric model the values and market shares are equal and we can simplify by writing $P\left(\gamma v^A + (1-\gamma) v^B\right)$. If the value of the service is low the politician may lose the next election and political benefit is low. While if the service is of high quality P is likely to stay in office; political benefit is high. Political benefit is increasing and concave in the average value of the service. P also has to raise taxes to pay for the services. The cost of transfer T is $D(T)$. Part of the cost arises from the distortions in the economy caused by taxes while part is political: voters do not like high taxes. The cost is increasing and convex in the transfer.

P designs the organization to maximize his own utility. Monetary transfers (bribes) between politicians and managers are illegal and unenforceable and therefore P indeed chooses an organization that maximizes his utility, not a joint surplus maximizing structure. P can choose to introduce competition or not. P's utility is:

$$V = P\left(\gamma v^A + (1-\gamma) v^B\right) - D(T)$$

If there is *no competition* each supplier gets the closest half of customers. The suppliers get their budget directly from P.

With *competition* P buys the service for customers from competing suppliers. P's decision depends on the average quality signal $v_i = \gamma v_i^A + (1-\gamma) v_i^B$ and takes into account the transportation costs for customers from different locations. The average value of the service is observable but is not verifiable. Suppliers cannot select the types they serve but receive a quantity

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of customers that depends on the relative value of the service and on the transportation cost. This is a universal service and all the patients who get referred to a hospital are served in the end. The Hotelling model gives the following demand function:

$$q_i\left(v_i, v_j\right) = \frac{v_i - v_j + t}{2t}.$$

The supplier is paid p per customer. Politician chooses p. In Section 7 we extend this and discuss alternative pricing schemes.

Figure 1 illustrates the timeline and sums up the model.

4 No competition

Without competition there is nothing contractible on which incentives could be based. Both effort and value of the service are unverifiable. Therefore an ex ante contract cannot provide incentives. Neither does ex post bargaining since efforts are sunk. M can be fired by P at no cost which is why M does not receive any reward for her effort in ex post bargaining. Accordingly, it is only the private benefits that provide incentives where there is no competition.

Manager's problem is to:

$$\underset{\left\{e_i^A, e_i^B\right\}}{Max} \quad w_i + B\left(v_i^A\left(e_i^A\right), v_i^B\left(e_i^B\right)\right) - C\left(e_i^A, e_i^B\right)$$

First order conditions give:

$$\mu_A - C_A\left(e_i^A, e_i^B\right) = 0 \tag{1}$$

$$\mu_B - C_B\left(e_i^A, e_i^B\right) = 0 \tag{2}$$

From these first-order conditions we can solve for some comparative statics. First, higher level of professionalism (for given preferences about allocation) increases both efforts.

$$\frac{de_i^A}{d\mu} = \frac{C_{BB} - C_{AB}}{C_{AA}C_{BB} - \left(C_{AB}\right)^2} > 0 \tag{3}$$

Second, higher preference for type A (for constant μ) increases effort for type A and decreases effort for type B.

$$\frac{de_i^A}{d\mu_A} = \frac{C_{BB} + C_{AB}}{C_{AA}C_{BB} - (C_{AB})^2} > 0 \tag{4}$$

$$\frac{de_i^B}{d\mu_A} = \frac{-(C_{AA} + C_{AB})}{C_{AA}C_{BB} - (C_{AB})^2} < 0 \tag{5}$$

If M gets more private benefits from type A than from type B, M will allocate effort more towards type A. First, there is the direct effect. Higher μ_A increases the marginal benefit of effort for type A but since μ is constant μ_B must be lower and therefore the marginal benefit of effort for type B decreases. Second, there is the indirect effect. When there are negative externalities between the tasks increasing effort for type A will increase the marginal cost for type B ($C_{AB} > 0$). This can result, for example, from time constraints. With full workload effort for type A can be increased only at the expense of type B. Therefore this indirect effect tends to re-enforce the direct effect. Effort is allocated towards type A since the marginal benefit from type A has increased, and additionally, this will increase the marginal cost of type B. So effort is allocated even further away from type B.

If there are positive externalities between the tasks increasing effort for type A makes it easier for the manager to work with type B ($C_{AB} < 0$). Positive externalities could arise from learning spill-overs between the tasks. In this case the indirect effect counteracts the direct effect. Effort for type A increases because its marginal benefit is higher and this lowers the marginal cost of type B effort. In this case the allocation of effort away from type B is smaller than allowing only for the pure direct effect.

We have not imposed assumptions about the sign of C_{AB}. A plausible assumption is that with low levels of effort it is negative i.e. there are positive externalities between the tasks. Positive externalities can arise from learning and more varied, less boring work. With high levels of effort the time constraints start to kick in and C_{AB} turns positive.

P can only pay a fixed wage to M. Since a fixed wage does not provide any incentives there is no reason for P to pay a positive wage. P sets $w_i = 0$ and this also satisfies M's participation constraint.

P's utility is:

$$U^N = P\left(\gamma v^{A,N} + (1 - \gamma) v^{B,N}\right) - D(0)$$

where superscript N refers to no competition.

5 Competition

With competition M's problem is to choose efforts and wages to maximise her utility subject to the constraint that the supplier cannot make losses.

$$\max_{\left\{w_i, e_i^A, e_i^B\right\}} \quad w_i + B\left(v\left(e_i^A\right), v\left(e_i^B\right)\right) - C\left(e_i^A, e_i^B\right)$$

$$s.t. \ pq_i\left(v_i, v_j\right) - w_i \geq 0$$

The horizontal differentiation model gives the following demand function:

$$q_i\left(v_i, v_j\right) = \frac{v_i - v_j + t}{2t} \tag{6}$$

where the average value of the service is:

$$v_i = \gamma v_i^A + (1 - \gamma) v_i^B$$

M is in effect a residual claimant and therefore the no-loss constraint is always binding. So we can write M's problem as:

$$\max_{\left\{e_i^A, e_i^B\right\}} \quad p\frac{v_i - v_j + t}{2t} + B\left(v_i^A, v_i^B\right) - C\left(e_i^A, e_i^B\right) \tag{7}$$

The optimal effort levels are given by the following first-order conditions:

$$\gamma\frac{p}{2t} + \mu_A - C_A\left(e_i^A, e_i^B\right) = 0 \tag{8}$$

$$(1 - \gamma)\frac{p}{2t} + \mu_B - C_B\left(e_i^A, e_i^B\right) = 0 \tag{9}$$

Comparing these first-order conditions with the optimal choice of effort without competition (equations (1) and (2)) we see that the only difference is the first term. With competition higher effort for type A increases the average effort by γ which increases the market share by $\frac{1}{2t}$ and accordingly the revenues of the supplier (which can be spent on higher wages) increase. Competition thus introduces monetary rewards in addition to private benefits. The monetary rewards for each type depend on the proportion of that type in the population.

In the end of this section we analyse the optimal choice of p by the politician. Before that we examine how changing the price affects the level of efforts and the resulting value of the service. Since no competition is equivalent to competition with $p = 0$ we can find the effects of competition on quality by total differentiation with respect to p. Given the sign of $\frac{de_i^k}{dp}$ does not depend on the level of p total differentiation allows us to make global comparisons. E.g. if $\frac{de_i^k}{dp}$ is positive we can conclude that the value of the service for type k is higher for any positive p compared to the value resulting from $p = 0$. By total differentiation we obtain:

$$\frac{de_i^A}{dp} = \frac{[\gamma C_{BB} - (1-\gamma) C_{AB}]}{2t\left[C_{AA}C_{BB} - (C_{AB})^2\right]} \tag{10}$$

$$\frac{de_i^B}{dp} = \frac{[(1-\gamma) C_{AA} - \gamma C_{AB}]}{2t\left[C_{AA}C_{BB} - (C_{AB})^2\right]} \tag{11}$$

The first observation is that the effect of introducing competition has an ambiguous effect on effort and the resulting quality of service. Competition does not necessarily increase quality for both types. Competition may not even have much effect at all. From these equations we can see that the quality is very unresponsive to the introduction of competition if (i) transportation costs are high (then competition is very weak) or (ii) marginal cost of effort is increasing very fast (high C_{AA} and C_{BB}). With high initial workloads there is no scope for higher effort.

Proposition 1 states our results regarding the effects of competition on the quality of service for the different types.

Proposition 1 *Introduction of competition*
(i) increases the quality of the service for the majority,
(ii) decreases the quality of the service for the minority if and only if the minority is small ($\gamma \geq \widehat{\gamma}$) and there are negative externalities between the tasks ($C_{AB} > 0$).

Proof. For $\gamma = \frac{1}{2}$ $\frac{de_i^A}{dp} = \frac{[C_{BB} - C_{AB}]}{4t\left[C_{AA}C_{BB} - (C_{AB})^2\right]} > 0$. For $\gamma = 1$ $\frac{de_i^A}{dp} = \frac{C_{BB}}{2t\left[C_{AA}C_{BB} - (C_{AB})^2\right]} > 0$. And $\frac{\partial^2 e_i^A}{\partial p \partial \gamma} > 0$. Therefore $\frac{de_i^A}{dp} > 0$ for all $\gamma \in \left[\frac{1}{2}, 1\right]$.

For $\gamma = \frac{1}{2}$ $\frac{de_i^B}{dp} = \frac{[C_{AA} - C_{AB}]}{4t\left[C_{AA}C_{BB} - (C_{AB})^2\right]} > 0$. For $\gamma = 1$ $\frac{de_i^B}{dp} = \frac{-C_{AB}}{2t\left[C_{AA}C_{BB} - (C_{AB})^2\right]} \overset{s}{=} -C_{AB}$ where $\overset{s}{=}$ denotes that the expressions have the same sign. And $\frac{\partial^2 e_i^B}{\partial p \partial \gamma} <$

0. Therefore the exists $\widehat{\gamma}$ such that for $\gamma \in \left[\frac{1}{2}, \widehat{\gamma}\right)$ $\frac{de_i^B}{dp} > 0$ and for $\gamma \in [\widehat{\gamma}, 1]$ $\frac{de_i^B}{dp} \overset{s}{=} -C_{AB}$. ∎

Suppose the minority is very small $(\gamma \approx 1)$. Then competition will increase the quality for the majority and $\frac{de_i^B}{dp}$ has the same sign as $(-C_{AB})$. All the money comes from type A and therefore all the additional incentives competition brings are for type A. If there are positive externalities between the tasks also type B will benefit indirectly from the reform as higher effort for type A lowers the marginal cost of serving type B. While with negative externalities the minority will get a lower quality service compared to no competition.

When the minority is very large $\left(\gamma = \frac{1}{2}\right)$ both type A and B bring money and therefore competition provides additional incentives for both tasks and everybody will get a better service.

To summarise the effects of competition on users and suppliers the majority type always benefits from competition, while the minority suffers if it is small and the suppliers already had full work loads prior to the reform (negative externalities). The suppliers have lower job satisfaction if they like the small minority and pure private benefits motivate them to work very hard. In that case, competition cannot make them work much harder but they have to allocate effort on tasks they do not like as much.

The cost of the service is endogenous. Accordingly taxes are equal to the suppliers' revenues.

$$T = \sum_{i=1}^{2} pq_i = p \sum_{i=1}^{2} q_i = p$$

Having determined the effect of the price on the value of the service and tax costs we can write P's maximisation problem as:

$$\underset{\{p\}}{Max}\ P\left(\gamma v^A\left(p\right) + \left(1 - \gamma\right) v^B\left(p\right)\right) - D\left(p\right) \tag{12}$$

The optimal p^* is given by the following Kuhn-Tucker conditions:

$$P'\left(\gamma v^A\left(p^*\right) + \left(1 - \gamma\right) v^B\left(p^*\right)\right)\left(\gamma\frac{\partial v^A}{\partial p} + \left(1 - \gamma\right)\frac{\partial v^B}{\partial p}\right) - D'\left(p^*\right) \leq 0 \tag{13}$$

$$p^* \geq 0 \tag{14}$$

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$$p^* \left[P' \left(\gamma v^A \left(p^* \right) + \left(1 - \gamma \right) v^B \left(p^* \right) \right) \left(\gamma \frac{\partial v^A}{\partial p} + \left(1 - \gamma \right) \frac{\partial v^B}{\partial p} \right) - D' \left(p^* \right) \right] = 0$$
(15)

It is important to note that we are not assuming an interior solution for p but in fact are particularly interested in the corner solution $p = 0$. This is discussed in the following section.

6 Optimal institution

In this section we examine in detail when the optimal price is strictly positive, that is, when it is optimal for P to introduce competition. Since competition with $p = 0$ is equivalent to no competition, the comparison of these institutions boils down to the question if optimal p is positive or zero. To compare the two institutions we only need to find out whether $p^* > 0$ under competition. If $p^* > 0$ it must be that competition dominates no competition. P could have chosen $p = 0$ which is equivalent to no competition but did not find that maximising his utility. On the other hand if P would choose $p^* = 0$ that is in effect choosing no competition. This reasoning gives Theorem 1.

Theorem 1 *No competition is optimal if and only if*
$$P' \left(\gamma v^A \left(0 \right) + \left(1 - \gamma \right) v^B \left(0 \right) \right) \left(\gamma \frac{\partial v^A}{\partial p} \mid_{p=0} + \left(1 - \gamma \right) \frac{\partial v^B}{\partial p} \mid_{p=0} \right) - D' \left(0 \right) \leq 0$$

Proof. Our assumptions guarantee that P's utility is concave in p. Therefore $p^* = 0$ if and only if the marginal change in P's utility is non-positive evaluated at $p = 0$. ∎

Corollary 1 gives some intuitive sufficient conditions for the above condition to hold.

Corollary 1 *No competition is optimal if:*
(i) $P' \left(\gamma v^A \left(0 \right) + \left(1 - \gamma \right) v^B \left(0 \right) \right) \longrightarrow 0,$
(ii) $\gamma \frac{\partial v^A}{\partial p} \mid_{p=0} + \left(1 - \gamma \right) \frac{\partial v^B}{\partial p} \mid_{p=0} \longrightarrow 0,$ *or*
(iii) $D' \left(0 \right) \longrightarrow \infty.$

The benefit of competition is that the allocation of effort better represents the proportions in population. Majority will get a better service and even the

minority benefits unless it is very small and there are negative externalities between the tasks. The cost of competition is higher taxes. The optimal institution depends on this trade-off.

The results depend on three effects. Part *(i)* of Corollary 1 depends on the private benefits. It says that if pure private benefits provide enough motivation so that additional effort and quality bring only very small additional political benefits, there is no need to introduce competition. (Note that $v^i(0)$ for $i = A, B$ is the level of quality without competition.) A necessary condition for this to be true is that $\frac{\mu_A}{\mu}$ has to be close to γ. If $\frac{\mu_A}{\mu}$ is very different from γ, say $\frac{\mu_A}{\mu} \to 0$ and $\gamma \to 1$, pure private benefits give motivation only to serve the negligible minority and the majority gets very poor quality without competition. Then it cannot be true that increasing p, which makes the allocation of effort to better represent the proportions in population, would not increase political benefits. Therefore if $\frac{\mu_A}{\mu}$ is close to γ, that is M likes the average citizen, there is not that great need to use competition to force M to change her allocation of effort.

The second effect is the responsiveness of quality/effort with respect to price. If effort is very inelastic competition has hardly any effect on effort and therefore no competition dominates. Effort is very inelastic when transportation costs are very high. Then higher quality does not attract additional customers who prefer the closest supplier. If only very weak competition could be implemented between the suppliers, it is better not to introduce it.

The third effect is the political costs of taxes. If increasing taxes is very costly P will simply choose an institution that minimises taxes regardless of the quality effects. Then no competition is optimal.

7   Extensions

7.1   Price discrimination

In our model the supplier is paid a price p per patient under competition and our focus is on how different institutions affect the level and allocation of effort. Much of the literature on contracting in health care examines the use of different prices for different types of patients in order to increase efficiency. So for example, Medicaid reimbursement is based on average cost of the treatment of a particular medical condition (the DRG payment system). We can address the question whether more sophisticated pricing could be used

to improve the outcome under either competition or single agency.

Firstly it is important to notice that under no competition there are no prices. Therefore alternative pricing schemes would only affect the outcome under competition. Let us now analyse the use of different prices for different types of customers. This requires that the types are verifiable because otherwise the supplier would claim all the customers to be of the more expensive type. Above we have assumed that the types are unverifiable. Denote the prices charged for the different types by p^A and p^B. The politician's maximisation problem changes from (12) to:

$$\underset{\{p^A, p^B\}}{Max} \ P\left(\gamma v^A\left(p^A\right) + (1-\gamma)\, v^B\left(p^B\right)\right) - D\left(\gamma p^A + (1-\gamma)\, p^B\right)$$

The politician will choose no competition if and only if $p^A = p^B = 0$ maximises his utility, that is if and only if:

$$P'\left(\gamma v^A\left(0\right) + (1-\gamma)\, v^B\left(0\right)\right)\frac{\partial v^A}{\partial p^A}\mid_{p^A=0} -D'\left(0\right) \leq 0 \text{ and} \qquad (16)$$

$$P'\left(\gamma v^A\left(0\right) + (1-\gamma)\, v^B\left(0\right)\right)\frac{\partial v^B}{\partial p^B}\mid_{p^B=0} -D'\left(0\right) \leq 0 \qquad (17)$$

These necessary and sufficient conditions (16) and (17) are nearly the same as the condition in the uniform pricing case given in Theorem 1. The only difference is that with uniform pricing $P'\left(.\right)$ is multiplied by $\left(\gamma\frac{\partial v^A}{\partial p}\mid_{p=0} + (1-\gamma)\,\frac{\partial v^B}{\partial p}\mid_{p=0}\right)$ while with price discrimination it is multiplied by $\frac{\partial v^A}{\partial p^A}\mid_{p^A=0}$ in (16) and by $\frac{\partial v^B}{\partial p^B}\mid_{p^B=0}$ in (17). Therefore although the optimal boundary between competition and no competition is not exactly the same with uniform pricing and price discrimination, our results do not change qualitatively. Optimal institution still depends on the same three effects: marginal increase in political benefits, responsiveness of quality to competition and marginal political costs of taxes.

7.2 Majority voting

In our model political benefits depend on the average value of the service. Alternatively the politician could care only about the majority. Then politician's maximisation problem would be:

$$\underset{\{p\}}{Max} \ P\left(v^A\left(p\right)\right) - D\left(p\right)$$

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However, this would not change our results qualitatively. The same three effects are still present.

8 Conclusions

Despite a widespread interest in increasing the role for incentives in public sector organisations (Tirole 1994), there has been little formal analysis of the introduction of competition within government. Yet several governments have introduced 'quasi-market' reforms in health care and other welfare sectors. This paper analyses the choice between competing public sector suppliers and a single public supplier for a universal service, and corresponds to the choice between a 'quasi-market' and a single agency. As reforms are introduced by politicians we assume that this choice is made by a self-interested politician. As the service is universal, suppliers must serve all types, but have preferences for serving one type over others, which may not accord with the preferences of the population and the politician.

We show that when the suppliers' pure private motivations are high, the political cost of taxes are high and the responsiveness of quality to price is low, the politician will not want competition. We also show that the results are robust to relaxing the assumption of non-verifiability of types and allowing price discrimination, and to different preferences of the politician.

We focus on the impact of reform on one dimension of output: quality. A useful extension would be to allow cost reducing effort as well as quality increasing effort (e.g. Hart *et al* 1997) and to examine the impact of this on the choice between forms of government organisation. Another extension would be to allow suppliers to select types i.e. to relax the universal service constraint for all suppliers. This is definitely an issue in quasi-markets in education where schools compete by selecting pupils as well as in effort spent on the existing pupil stock. In health care, which is the case analysed here, this is perhaps less of an issue. Finally, our results indicate that the greater the distortion of effort under a single agency, the more likely is reform. It should be possible to test this result empirically. All these remain for further work.

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