Local Public-Services Provision under Public-Private Partnerships: Contractual Design and Contracting Parties Incentives

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Local Public-Services Provision under Public–Private Partnerships: Contractual Design and Contracting Parties Incentives

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ABSTRACT When deciding to resort to a PPP contract for the provision of a local public service, local governments have to consider the demand risk allocation between the contracting parties. In this article, I investigate the effects of demand risk allocation on the accountability of procuring authorities regarding consumers changing demand, as well as on the cost-reducing effort incentives of the private public-service provider. I show that contracts in which the private provider bears demand risk motivate more the public authority from responding to customer needs. This is due to the fact that consumers are empowered when the private provider bears demand risk, that is, they have the possibility to oust the private provider in case of non-satisfaction with the service provision, which provides procuring authorities with more credibility in side-trading and then more incentives to be responsive. As a consequence, I show that there is a lower matching with consumers’ preferences over time when demand risk is on the public authority rather than on the private provider, and this is corroborated in the light of two famous case studies. However, contracts in which the private provider does not bear demand risk motivate more the private provider from investing in cost-reducing efforts. I highlight then a tradeoff in the allocation of demand risk between productive and allocative efficiency. The striking policy implication of this article for local governments would be that the current trend towards a greater resort to contracts where private providers bear little or no demand risk may not be optimal. Local governments should impose demand risk on private providers within PPP contracts when they expect that consumers’ preferences over the service provision will change over time.

KEY WORDS: Local public service delivery, public–private partnerships, incomplete contracts, political accountability, consumers’ empowerment

1. Introduction

Reforming local public-service delivery occupies a central position in the current policy agenda in the world. Public–private partnerships (PPPs), which are
contracts between the public and private sector to build and operate infrastructure for public-service provision, are considered as an alternative model to the traditional public provision for public services. Nevertheless, many concerns have been raised regarding this emerging organisational model (see Engel et al. 1997, Guasch 2004, Chong et al. 2006, Estache 2006, Martimort and Straub 2006, Athias and Nunez 2008, Guasch et al. 2008). The most stringent worries concern the ex post adaptation inflexibilities inherent to these long-term contracts. Adaptation is important when consumers’ preferences change and improved policies or technologies are discovered. As the major feature of PPPs is that they are long-term service contracts, it is highly likely that contracting parties will be unable to write complete contracts that cover all contingencies, and numerous are the cases that offer good illustrations of the difficulties for procuring authorities to reaching an agreement with private public-service providers on contractually unanticipated service adaptations. It is often noted that “[a] key concern with long-term PPP contracts is the level of flexibility that they offer to authorities to make changes either to the use of assets or to the level and type of services offered” (PricewaterhouseCoopers 2005, p. 33).

Except Ellman (2006), studies have always explained the ex post adaptation problems by the distorted incentives for the private public-service provider to invest in the research into innovative approaches to carrying out the service provision (Hart et al. 1997, Hart 2003, Bennett and Iossa 2006). None of them approach this issue from a political point of view; that is, none of them give an active role to public authorities. However, it seems that public authorities also have an important role to play in the adaptation of private public-service provision over time for the following reasons. First, any PPP is between a public authority and a private public-service provider; that is, there is no direct democracy (the public cannot vote directly to select and oust the private provider). Second, there is no market accountability of private providers, since the price applied to consumers, if any, is a regulated price, not a market price. Finally, public authorities, as elected delegates of consumers, are duty bound to discover adaptations and consumers’ preferences and to exercise pressure on the private provider to adapt the public service to satisfy the changes in the effective consumers’ demand. It seems then that political accountability, that is, the responsiveness of public authorities to consumers concerns, has also to be considered when one aims to tackle the issue of the inefficient development of PPPs over time. In other words, public authorities have to be considered as active players instead of passive bystanders of the general efficiency of PPPs.

Ellman (2006) was the first to theoretically raise the question of the accountability of public authorities in the adaptation over time of the private provision of public services. In this article, the author compares political accountability whether the public-service provision is public or private, boiling down to a control rights issue. However, it is now clear that the term PPP covers a broad range of contractual agreements that differ in terms of risk allocation between the public authority and the private provider (Grout and Stevens 2003, Athias and
Saussier 2007, Iossa and Martimort 2008). As ‘the devil is in the details’, it seems at least as important to analyse political accountability according to the contractual design of PPPs. This is precisely what this article aims to do. In particular, a critical aspect of any PPP contract is the allocation of demand risk between the public authority and the private provider. Broadly speaking there are two main contract types for delegating public services to private operators: contracts where private providers bear no demand risk (the payments to the private provider are service payments paid by the procuring authority according to performance criteria), and contracts where private providers bear all demand risk (the payment depends on the actual service demand).

To investigate how the allocation of demand risk between the public authority and the private provider affects politicians’ responsiveness to consumers’ concerns and the private provider’s incentives to reduce costs, I present a simple incomplete contract theory model in which (1) procuring authorities are involved in adaptation, that is exert non-contractible effort to respond to consumers’ demands; (2) consumers may have the power to sanction private providers; (3) private providers exert non-contractible efforts to cut costs. I show that contracts in which the private provider bears demand risk motivate the public authority more from responding to customer needs. This is due to the fact that under such a contract consumers are empowered, that is, have the possibility to oust the private provider, which provides procuring authorities with more credibility in side-trading and then more incentives to be responsive. As a consequence, I show that there is a lower matching with consumers’ preferences over time when demand risk is on the public authority rather than on the private provider. In other words, I show that contracts in which the private provider does not bear demand risk rule more out the accountability – regarding service adaptations – of procuring authorities. However, I show that contracts in which the private provider does not bear demand risk motivate more the private provider from investing in cost-reducing efforts. I highlight then a tradeoff in the allocation of demand risk between productive and allocative efficiency.

The underlying logic of this model is illustrated in the context of two case studies, one reflects the case of a contract in which demand risk is on the public authority (the British school catering case) while the other reflects the case of a contract in which demand risk is on the private provider (the French highway case). These case studies are useful to understand, first, the role/efforts of the respective contracting parties in a PPP, and second, why an adaptation required by the public authority is more difficult to implement in the first case than in the second.

The striking policy implication of this article for local governments would be that the current trend towards a greater resort to contracts where private providers bear little or no demand risk may not be optimal. I show that demand risk allocation will vary according to the relative importance of the benefits from adaptation compared to the benefits from cost-reducing efforts, highlighting that no contractual design is optimal and always dominant. In particular, the article shows that local governments should impose demand risk on private providers.
within PPP contracts when they expect that consumers’ preferences over the service provision will change over time.

The article is organised as follows. Section 2 presents the related literature as well as two case studies that highlight the role of the PPP contracting parties. In section 3, I present the basic model of contracting parties’ incentives under both types of PPP and solve it, which leads to our theoretical propositions. In section 4, I apply the model to understanding the two case studies presented in section 2. Section 5 concludes.

2. Literature background

Political economy of government responsiveness

This article is linked to the literature on the political economy of government responsiveness. For instance, Besley and Burgess’ (2001 and 2002) model derives how governments become more responsive to people when people become more aware of how government actions affect them, which is determined by the freedom of the press. Also, Besley and Ghatak (2003) tackle the question of the best process by which service providers, consumers and procuring authorities come together to create an organisation. This could be governed by choice, as when a parent picks a school for their child, or by government policy. The authors show, in a non-formalised way, that empowering consumers, by allowing them to choose between providers with different service provisions, is a potential source of welfare improvements. They explain that empowering consumers means that the nature of the principal-agent problem changes. While the centralised model of public-service provision has two layers of agency problems, between consumers and elected officials and between the government and the service provider, the structure of the problem when consumers of public services are empowered provides a closer link between them and service providers. Thus, empowering consumers can offer a better match between consumers and providers, in other words, a greater allocative efficiency.

This approach underpins the representation developed in this article of the accountability mechanism for service adaptations under the two differing contractual procedures. While the centralised model of public-service provision corresponds to the accountability structure implied by a contract in which demand risk is on the public authority, the model in which consumers are empowered fits with the accountability structure of a contract in which the private provider bears demand risk. As a matter of fact, under such contracts, consumers are empowered to the extent that the remuneration of the private provider depends on the demand for the service. Thus, consumers have the power to oust the service provider by not using the service anymore and hence make the private provider go bankrupt. This is in line with what Hirschman (1970) calls ‘Exit’. Making the private provider bear demand risk can then empower consumers, which can then lead to a better alignment of service provision preferences.
Contractual choices for local public-services provision

As highlighted by Bel and Fageda (2007), there is an extensive literature on the ‘make’ or ‘buy’ decision of local governments for the provision of their public services. Some studies corroborate the theoretical propositions of the transaction cost theory and find a negative relationship between the degree of asset specificity and uncertainty related to a given service and the propensity of cities to contract out with private firms the provision of the service in question (Powder 1996, Brown and Potoski 2003, Levin and Tadelis 2010). These studies also show that when the difficulty in measuring the quality of the service provision is high, the likelihood that cities contract out the given service is low. This is explained by the fact that contractual difficulty and difficulty in measuring the quality of the outcome can lead to incomplete contracts, and then to a high risk that the quality of the privately provided service is low. This question has been addressed by Hart et al. (1997), who show that the cost of an inmate is about 10% less in private prisons than in public ones, due to a reduction in labour costs. In other words, private prisons used to have a smaller staff and to hire less-qualified workers. The consequence of this is that the reported number of injuries to staff and prisoners as well as the number of incidents or the use of force are significantly higher in private correctional institutions than in public ones.

The importance of political considerations as well as ideological issues in the choice of the organisational mode of local public authorities for the provision of their public services has also been highlighted in some studies (López-de-Silanes et al. 1997, Brown and Potoski 2003, Levin and Tadelis 2010, Picazo-Tadeo et al. 2012). Other important determinants of the contractual choices of local public authorities lie in their fiscal capacity and degree of indebtedness. Recent studies show that municipalities with a high fiscal capacity foster in-house provision (Brown and Potoski 2003, Hebdon and Jalette 2008, Levin and Tadelis 2010) and confirm that a high long-term indebtedness of a municipality is associated with more contracting out (Hebdon and Jalette 2008, Levin and Tadelis 2010). While all these studies focus on the ‘make’ or ‘buy’ decision, that is, on the public–private dilemma, Albalate et al. (2012) examine the determinants – the same as those highlighted above – of the degree of private participation within PPP projects, considering four main PPP contract types (management contracts, design and build contracts, concessions and Build-Operate-Transfer (BOT)-type contracts, and asset sales).

By contrast, I focus in this article on the ‘concessions and BOT-type contracts’ category of Albalate et al. (2012) – considered as the only true PPP projects if we limit the definition of PPP projects to the bundling of building and operation in a single contract – and investigate the determinants of the choice of demand risk allocation within these projects. As a matter of fact, we can distinguish two main contract types within these projects: contracts where private providers bear no demand risk (the payments to the private provider are service payments paid by the procuring authority according to performance criteria), and contracts where private providers bear all demand risk (the payment depends on the actual service
Both are long-term, global contracts on the design, building, financing and operation of a public service and consist in output specifications systems. Both contracts can be considered as fixed-price contracts to the extent the private provider’s remuneration does not depend on his costs (the procuring authority offers the private provider a pre-specified price for completing the project in both contracts). They do not differ in the magnitude of implication of the private operator, both contracting procedures formally delegate to the private provider sufficient residual control rights to provide the service free of interference. The main difference between these two contractual practices concerns therefore the allocation of demand risk.

The traditional model of PPPs in the world has been contracts in which demand risk is on the private provider. According to the World Bank’s private participation in infrastructure database, between 1990 and 2000, overall 65% of the projects in Latin America and the Caribbean were adjudicated under this contractual form. This PPP contract type is also the most common form of PPP in Europe, except in the UK, where the procuring authorities resort above all to contracts in which demand risk is on the public authority, designated by the acronym PFI ‘the Private Finance Initiative’. But the contracting model in which the private provider bears demand risk has increasingly come under fire in recent times (Guasch 2004, Estache 2006, Athias and Nunez 2008, Engel et al. 2009). The main criticisms are related to the high incidence of renegotiation observed under these contracts due mainly to the demand overestimation, strategic or not, by private providers in their bids. The trend has been then to not impose demand risk on private providers anymore. Contracts in which the public authority bears demand risk are therefore increasingly being adopted around the world to move away from the other model. This is particularly pronounced in Europe, where countries have recently promulgated guidelines so as to bring in such a contract as an alternative to the other contract type, for example, the June 2004 act in France instituting the new ‘contrats de partenariat’.

While it is commonly thought that contracts where private providers bear no demand risk are used when it is not possible to make users pay (for any technological, social or institutional grounds) or when the services are not profitable, we observe in practice, on the one hand, that some contracts specify that the service provider is remunerated according to the service demand even if users do not pay (they are most often known under the name of ‘shadow toll contracts’) and, on the other hand, in some cases, that the remuneration of the service provider is dependent on continuity of service supply while users pay a toll (to the public authority). Thus, it appears that the choice between a contract in which the private provider bears demand risk and a contract in which it does not, depends neither on the ability to make users pay nor on the profitability of the service in question. However, there is no point in making the remuneration of the private provider dependent on the service demand if there is no real demand, as for prisons, or if demand is inelastic, as for the defence sector, public lighting.

Therefore, the types of local public services better concerned by this article are transport infrastructure (roads, urban transport, car parks, and so on), leisure
centres (for example, stadiums), schools, garbage collection and refusal, and hospitals.

Efforts in PPPs: empirical evidences

The experience of the British government with school dinners offers a good example of the public authority’s role in the efficiency of PPPs. As highlighted by Ellman (2006), in the aftermath of a series of television reports on school dinners by celebrity chef Jamie Oliver in early 2005, the government rushed to quench mounting public discontent over low quality, committing to make improvements even for schools with catering services provided through PPP contracts. Thus, this case study points to the fact that the private provider invested in cost-reducing efforts whereas the procuring authority tried to make the private provider adapt the service according to the fundamental change in the consideration of healthy food by the public.

Another good example of the public authority’s efforts in PPPs is provided by the episode of the ‘Shipwrecked Men of the Road’ of Saint-Arnoult-In-Yvelines. On 4 January 2003, a French weather forecaster underestimated the extent of the snow which would fall on the French north and centre. As a consequence, the private provider concerned did not take all the necessary measures to preserve the viability of the base joint of two highways. Thus, when plates of glaze appeared on the base joint, the already dense circulation became completely blocked. The absence of measures such as the diversion of traffic and information for the users by the private provider increased the number of users blocked in a tailback of 60 km. After this event, there was public discontent about the lack of suitable means in case of considerable falls of snow. As a consequence, the French government pressured the private provider to adapt the service provision accordingly, and to invest in less heavy salting vehicles as well as in automatic salting systems located at crucial points.

The following model aims to explain why in the British school catering case the government did not manage to make the private provider implement the adaptation responding to the consumers’ changing preferences, whereas in the second case the government was successful.

3. The model

Main intuition of the model

In this article I consider a contractual relationship in which a public authority contracts with a private provider. As already highlighted, the private provider invests in non-contractible cost-reducing efforts. The public authority makes a non-verifiable investment, which corresponds to an effort of adaptation of the public service provision over time so as to respect consumers’ changing demand. As both contract types are PPP contracts in which the private provider has the control rights over the service provision, renegotiation should take place to allow the adaptation required by
the public authority to be implemented. Both parties can hold-up each other and the contracting parties’ incentives are driven by the (anticipated) outcome of the (efficient) renegotiation about the sharing of the non-contractible surplus generated by the non-verifiable efforts (backward induction).

I assume that the private provider faces a risk of bankruptcy when he bears demand risk since consumers can sanction the private provider in case of dissatisfaction with the service provision. Thus, when the private provider bears demand risk, as his remuneration can be lowered by the consumers’ sanction in case of non-adaptation of the service provision, he has less hold-up opportunities over the surplus generated by the implementation of the service adaptation required by the public authority. In other words, his renegotiation power is reduced so that the public authority can more easily renegotiate to implement the adaptation. As a consequence, the public party receives more of the benefit of the adaptation and her incentives to be responsive to consumers’ concerns are therefore strengthened. When the private provider does not bear demand risk, there is no possible sanction from consumers so that his renegotiation power and his hold-up opportunities are high and, as a consequence, the implementation of the adaptation much more difficult. The public authority, anticipating such a difficulty, will then underinvest ex ante when the private provider does not bear demand risk.

In addition, when the private provider bears demand risk, as he can go bankrupt in case of renegotiation failure, he might not receive the entire surplus generated by his cost-reducing efforts. By contrast, when he does not bear demand risk, he is sure to receive the full surplus from his cost-reducing efforts. So, the private provider’s cost-reducing efforts will be lower when he bears demand risk than when he does not.

As a consequence, I show that when benefits from adaptation are important but benefits from cost-reducing efforts are not, then it is socially preferable to put demand risk on the private provider. At the other extreme, when benefits from cost-reducing efforts are important but benefits from adaptation are not, designing a contract in which demand risk is on the public authority may be particularly sensible.

**Model framework**

I consider two actors, a procuring authority $PA$ (for example, a mayor, local government) and a private service provider $PM$ (private manager), as well as a special third player, the users of the public service (the consumers) $C$, that can influence $PA$ and $PM$ but cannot negotiate contracts with them. More specifically, I assume in this model that consumers play a role only through their ability to sanction the private provider when the latter bears demand risk. In other words, in this model, consumers are considered as a semi-player to the extent that I do not analyse the interactions between them and public authorities, assuming that public authorities always reflect consumers’ preferences. Such an assumption is motivated by the fact that I consider core public services, to which consumers are very sensitive, and hence the adaptations they require are most often politically salient.
PA organises the service provision on the consumer’s behalf and always delegates the service provision to a private manager (PM). PA can however choose between a contract in which the private provider does not bear demand risk and a contract in which the private provider bears demand risk. As already mentioned, the main difference between these two contractual forms lies in the power conferred to consumers who, in case of dissatisfaction with the public service provision (for example, non-adaptation to their preferences), can sanction PM when PM bears demand risk. In fact, if consumers do not use the service, the remuneration of PM will be affected. Nevertheless, it is not a case of ‘direct democracy’ in the sense that the contract remains between PA and PM only, neither about market accountability since the price (or toll if consumers pay) paid to PM for the provision of the public service is the price regulated by the contract (not a market price). Thus, under both types of contract, if an adaptation is required, not only the adaptation but also and above all the price adaptation will have to be negotiated between PA and PM. Service adaptation can therefore occur only if PA and PM reach an agreement on the adaptation and the price adaptation. The hope is then that PA will pressure PM to adapt the public service to satisfy the changes in the effective demand. Demand risk allocation matters because it affects payoffs in case of default of renegotiation.

**Benchmark model**

At the start of their relationship, PA and PM negotiate a basic contract $X$, that imposes demand risk either on PA or on PM. I assume that $X$ just compensates PM for standard costs of provision, whatever the contractual design.

I do not consider the cost of public funds because, in both contractual procedures, the remuneration of the private provider can stem either from users’ tolls or from public funds. $X$ generates a (net) payoff of $b$ for PA and $w(e)$ for PM, where $w(e)$ is PM’s cost advantage (over a standard provider) from investing $e$ in specialising to PA.\(^2\)

In other words, I assume that this cost-reduction investment $e$ by PM is fully relationship-specific, that is, if PM does not provide some service for PA, neither PM nor PA gets any benefit from $e$.

The investment $e$ is not contractible and nor is its payoff implication $w(e)$. The following regularity assumption guarantees sufficiency of first-order conditions.

**ASSUMPTION** 1. $w(0) = 0, w'(e) < 0, \forall e \geq 0, \lim_{e \to 0^+} w'(e) = \infty, \lim_{e \to \infty} w'(e) = 0$.

The overall payoffs for PM and PA do not depend on the contractual form. If $t_0$ is the payment that $PM$ receives for the provision of the basic public service, PA and PM’s overall payoffs from $X$ are:

$$u_{PA} = b - t_0$$

$$u_{PM} = t_0 + w(e) - e$$
Adaptation and political accountability

While PM invests e to cut costs, PA, for the various grounds mentioned above, invests effort i to discover what the consumers want and how to satisfy their demands. So i represents PA’s efforts to pay attention to consumers’ concerns about service quality. For instance, when there is a consumer’s demand for a concrete change, i raises the probability that PA recognises that the demand is serious and raises the probability that PA works out (in terms of pressure exercised on PM) how to satisfy consumers’ demands. This effort permits then PA and PM to adapt the basic contract X to changing consumers’ preferences.

I denote the corresponding adapted contract by Z, again with the non-contingent transfer set to just compensate the standard cost of provision. For simplicity, I assume that e helps PM to satisfy Z so that PM’s net payoff from enforcement of contract Z is again w(e). In other words e reduces PM’s costs by the same amount whether providing the basic or the adapted service. PA’s additional surplus from Z is v(i) where v ≥ 0, increasing and concave in i, represents the net gain in consumers’ welfare from the adaptation. In other words, v(i) measures PA’s success in identifying or discovering adaptations that are valued by consumers. So v(i) can be interpreted as a measure of PA’s responsiveness to consumers’ demand – how likely it is that PA manages to please consumers. Attentiveness i raises PA’s ability and propensity to respond.

If PA pays PM subsequent transfers (or toll increases) t in case of adaptation, then, normalising time discounting to zero, PA and PM’s overall payoffs from Z are:

\[ u_{PA} = b - t_0 + v(i) - t - i \]
\[ u_{PM} = t_0 + t + w(e) - e \]

The investment i is not contractible and nor is its payoff implications v(i). The following regularity assumption guarantees sufficiency of first-order conditions:

ASSUMPTION 2. v(0) = 0 v''(i) < 0 < v'(i) ∀i ≥ 0, lim_{i→0}, v'(i) = ∞, lim_{i→∞} v'(i) = 0 ∀i ≥ 0.

Parties are risk-neutral and PA has rational expectation about the renegotiation process when it makes its investments, that is, it can make correct calculations about the expected returns from any action. I assume information is symmetric and PM and PA negotiate a symmetric Nash bargain. Contractual design matters because it affects default outcomes in bargaining and hence the equilibrium choices of i and e. The timing of the model is as follows:

Stage 0: Demand risk is either on PA or on PM and contract X specifies the basic remuneration of the service provider t₀.
Stage 1: PA and PM sink their investments i and e.
Stage 2: Renegotiation takes place to allow the adaptation to be implemented in the service provision: PA and PM negotiate over stage three the contract Z and additional transfer $t$ (or toll increases).

Stage 3: PA and PM trade (jointly or with their market alternatives).

The remuneration $t_0$ agreed at stage zero cannot depend on observed investments, for it is not possible to specify in advance the delivery of a specific adaptation. So it plays no role in determining investment efficiency. The subsequent transfer $t$, negotiated on top of contract $Z$ at stage two, is the share of PA’s adaptation surplus that PA in equilibrium has to give to PM, in excess of its adaptation costs. This share depends on the stage two default payoffs which in turn depend on the demand risk allocation, as I will show.

PM is assumed to maximise its profits. PA maximises the social benefit, net of the payment to PM. In this setting, the first-best levels of investments $(e^*, i^*)$ maximise $b + v(i) - i + w(e) - e$. Hence, they satisfy

$$i^*|v'(i^*) = 1, e^*|w'(e^*) = 1 \text{ with } e^*, i^* > 0.$$

As both contracts are with a private provider, in default of renegotiation, I assume that PA is not able to exploit entirely investments $i$. This is due to the fact that under each type of contractual design, PA and PM commit to $X$ at stage zero. PA cannot therefore switch to alternative trades (except in case of contract breach, which is prohibitively expensive). However PA might still engage in ‘side-trades’ with another provider (private or public) $PM'$ to provide the service adaptation, alongside the basic public service provided by PM (this might be possible either through the implementation of a new provider, or through the resort to already available alternative provisions). Nevertheless, this market access by PA is rarely so effective: (1) PA may not be able to credibly duplicate the basic service by buying the adapted service from $PM'$ unless the additional value from adaptation is very high; (2) even when it is technologically feasible to have $PM'$ provide the adaptation service without the basic service, this would waste the economies of scope from having a single party provide and coordinate them. To capture PA’s reduced market access in case of default of renegotiation, I assume that PA only appropriates a fraction $(1 - k)$ of the adaptation return $v(i)$, where $k \in [0, 1]$ captures the ‘market-shielding’ effect of PPP. This actually boils down to an asset-specificity effect. In addition, $PM'$s side-trading returns are independent of $i$ and $e$, so I normalise $PM'$s additional side-trade value to 0.

**Effort when demand risk is on the public authority**

Note that default payoffs are the payoffs for each contracting party when the innovation is not implemented.

When demand risk is on PA, PA’s default payoff is:

$$b - t_0 + (1 - k)v(i) - i$$
Normalising $PM$’s alternative payoff to 0, $PM$’s default payoff is $t_0 + w(e) - e$. This is due to the fact that the contract protects $PM$’s cost-reduction efforts since $PA$ has to pay a fixed price for the basic service, provided that performance criteria are met. So $PM$ appropriates the full cost reduction surplus $w(e)$.

$PA$’s maximal gain from renegotiation is therefore $kv(i)$. $PA$ and $PM$’s renegotiation gains are half of this sum. So $PA$ chooses $i$ to maximise

$$b - t_0 + (1 - k)v(i) + \frac{1}{2}[kv(i)] - i$$
and $PM$ chooses $e$ to maximise

$$t_0 + w(e) + \frac{1}{2}[kv(i)] - e$$

The first-order conditions are now

$$v’(i) = \frac{2}{2 - k} \quad w’(e) = 1$$

**Effort when demand risk is on the private provider**

When the private provider bears demand risk, consumers are empowered to the extent that they can sanction the private provider in case of non-satisfaction with the service provision. The magnitude of this faculty depends mainly on the availability of alternative providers (in the case of a tramway, for instance, consumers could sanction the private provider by using the bus or taking the car). So I use the parameter $\lambda$ to capture the impact of the pressure exercised by consumers on $PM$’s remuneration, where $\lambda \in [0, 1]$. Notice that for $\lambda = 0$, that is, to make $PM$ experience null or negative profits, it is not necessary that all consumers switch to an alternative provision. Indeed, the profitability of most contracts is very sensitive to the demand, that is, a marginal change of the demand can generate negative profits for the private provider. The case of $\lambda = 1$ corresponds to a contract in which demand risk is on the public authority.

When $PM$ bears demand risk, $PA$ has more power and credibility to exploit investments $i$. For instance, if I consider that the number of consumers that switch to an alternative provider in case of default of renegotiation is such that $\lambda = 0$, implying no profits for $PM$ and then bankruptcy, $PA$ is then able to appropriate the full margin return $v(i)$ by negotiating with $PM’$ (no market-shielding effect any more) because $PA$ is able to switch – instead of side-trading – to alternative trading. Thus, if the impact of the pressure exercised by consumers on $PM$’s remuneration is $\lambda$, $PA$’s default payoff is

$$b - \lambda t_0 + (\lambda(1 - k) + (1 - \lambda))v(i) - i = b - \lambda t_0 + (1 - k\lambda)v(i) - i$$

In default of renegotiation, $PM$ may not appropriate the full cost reduction $w(e)$, since the demand for the service can be reduced. $PM$’s default payoff when he bears demand risk is then
PA’s maximal gain from renegotiation is therefore
\[ \lambda k v(i) + (1 - \lambda) w(e). \]

The gain from renegotiation is shared between the parties through a Nash-bargaining solution, so PA chooses \( i \) to maximise
\[ b - \lambda t_0 + (1 - k \lambda) v(i) + \frac{1}{2} [k \lambda v(i) + (1 - \lambda) w(e)] - i \] (4)
and PM chooses \( e \) to maximise
\[ \lambda [t_0 + w(e)] + \frac{1}{2} [k \lambda v(i) + (1 - \lambda) w(e)] - e \] (5)

The first-order conditions are now
\[ v'(i) = \frac{2}{2 - \lambda k}, \quad w'(e) = \frac{2}{2 - \lambda k} \] (6)

**Accountability and incentives comparisons**

**Political accountability.** The above first-order conditions demonstrate how a contract in which the private provider bears demand risk increases PA’s incentives to support adaptations from the marginal incentive \((2 - k)/2\) of \( v'(i) \) in Equation (3) to \((2 - \lambda k)/2\) of \( v'(i) \) in Equation (6). Thus, whether demand risk is on PA or on PM, PM is able to hold-up part of the surplus generated by PA’s investments \( i \) because PA has a limited access to the market in case of default of renegotiation. But this PM’s hold-up is a function of \( \lambda \) when PM bears demand risk: the greater the impact of the pressure exercised by consumers on PM’s remuneration, that is, the smaller \( \lambda \), the smaller the renegotiation surplus for PA, so the smaller the hold-up of PM of PA’s adaptation investments. In addition, in the case of \( \lambda = 0 \), PA’s incentives to support adaptations when the private provider bears demand risk are equivalent to the first-best incentives level. Accordingly, \( i^* \geq i^{\text{ConcessionContract(CC)}}(\lambda) \geq i^{\text{AvailabilityContract(AC)}} \) for any \( \lambda \).

The following proposition records these points.

**PROPOSITION 1.** Procuring authorities are more attentive and responsive to consumers’ demand when the private provider bears demand risk. This political accountability increases with the impact of the pressure exercised by consumers on PM’s remuneration (that is, \( \lambda \rightarrow 0 \)).

So, \( i^{CC}(\lambda) \geq i^{AC} \forall \lambda < 1 \), and \( \frac{d i^{CC}(\lambda)}{d \lambda} < 0 \forall \lambda > 0 \).

**Proof.** See Appendix
Proposition 1 states that the model in which the private provider bears demand risk always dominates the model in which the private provider does not bear any demand risk regarding the political accountability, that is, regarding the incentives given to the procuring authority to invest efforts to pay attention to consumers’ changing demands. Intuition follows from the fact that when the private provider bears demand risk, the potential sanction from consumers increases the public authority’s credibility in side-trading.

**Private provider’s cost-reducing incentives**

The above first-order conditions also demonstrate that the allocation of demand risk on PM rather than on PA decreases PM’s cost-cutting incentives. As a matter of fact, the model shows that for \( \lambda \) equal to 1, PM’s cost-cutting incentives are equivalent and optimal whatever the demand risk allocation. However, when \( \lambda \) tends towards 0, PM’s cost-cutting incentives when he bears demand risk, \( e^{CC} \), tend to be smaller than under an availability contract and under optimal. So, \( e^* = e^{AvailabilityContract(AC)} \geq e^{ConcessionContract(CC)} \lambda \) for any \( \lambda \). The following proposition records these points.

**PROPOSITION 2.** A private provider’s incentives to cut provision costs are more optimal when he does not bear demand risk. Increasing the impact of the pressure exercised by consumers on PM’s remuneration, that is, a smaller \( \lambda \), decreases the private provider’s incentives to invest in cost-reducing efforts.

So, \( e^{AC} > e^{CC}(\lambda) \forall \lambda < 1 \), and \( \frac{de^{CC}(\lambda)}{d\lambda} > 0 \forall \lambda > 0 \).

**Proof.** See Appendix

Proposition 2 highlights the fact that the contract in which demand risk is on the public authority always dominates the contract in which demand risk is on the private provider regarding the private provider’s incentives to cut costs.

The model highlights then a tradeoff between productive efficiency (demand risk on the public authority) and allocative efficiency (demand risk on the private provider) in demand risk allocation. Thus, demand risk will be more likely on the private provider (a) when the benefits from adaptation are important (and when the sanction power of consumers is significant); (b) when the benefits from cost-reducing efforts are weak.

4. Case studies

This section illustrates the underlying logic of the model in the context of two case studies. One case study illustrates the case of a contract in which demand risk is on the public authority (the school catering case) while the other one reflects the case of a contract in which demand risk is on the private provider (the highway case).
The British school catering case

Let us consider the British school catering case mentioned in section 2. The British government pledged to rid school menus of junk food after the series of television reports on school diners by celebrity chef Jamie Oliver in early 2005. However, new schools locked into 25-year contracts through private finance initiatives (PFIs) are finding that they cannot rid their menus of junk food despite the government’s pledge. Notice that PFI contracts are typical contracts in which demand risk is on the public authority. In this case, we can observe that the private provider, who does not bear demand risk, invested in cost-reducing efforts whereas the procuring authority had very low power to make the private provider adapt the service according to the fundamental change in the consideration of healthy food by the public. This perfectly illustrates Proposition 2 of the model, which states that there is weak adaptation under contracts where the public authority bears demand risk, whereas the cost-reducing efforts of the private provider are high.

If we now consider the features of this case in light of the theoretical model, the socially preferable contractual design would be to make the private provider bear demand risk. As a matter of fact, it can be considered that the social gain of having good quality school catering is very high. The main argument relies on public health considerations as junk food is now considered a main cause of health disease. Another argument is the potential high cost of not having school catering, in terms of opportunity costs for parents having their children for lunch everyday as well as in terms of security if they let them get lunch by themselves. This means that the benefits from adaptation are high and that it is preferable that the private provider, rather than the public authority, bears demand risk. If such a choice would have been made, the model predicts that adaptation would have more likely been implemented.

However, it is important to note that in the case of universities it can be speculated that putting demand on the private provider would be less likely to be socially preferable. This is due to the fact that considerations of the healthy consequences of junk food on the growth of students would be less important, the security matter would also be reduced as well as the opportunity costs for parents, so that in the end the benefits from adaptation would be low.

The highway case: the episode of the ‘Shipwrecked Men of the Road’

Let us consider now the episode of the ‘Shipwrecked Men of the Road’ of Saint-Arnoult-In-Yvelines mentioned in section 2. We know that, after the falls of snow of an unexpected magnitude in 2003, the French government pressured the private provider to adapt service provision according to consumers’ demand. And we know that the private provider, in fact, accepted investing in less heavy salting vehicles as well as in automatic salting systems located at crucial points.
It is important to note at this stage that in France the provision of highways is made through contracts in which demand risk is on the private provider. Thus, in contrast with the former one, this case study highlights the fact that when the private provider bears demand risk, in case of changing public demand or problems, service adaptation can occur. This is in line with Proposition 1. However, it can be speculated that the socially preferable contractual design would not be to make the private provider bear demand risk. As a matter of fact, in the case of highways, the potential benefits from non-contractible cost-reducing efforts are likely to be high, whereas the potential benefits from non-contractible adaptation efforts are likely to be low (since the uncertainty regarding consumers’ preferences over time is weak). Accordingly, the socially preferable contract design would be to put demand risk on the public authority.

These results are generally consistent with existing evidence on how PFI – and hence contracts in which demand risk is on the public authority – is working. According to a report commissioned by the Treasury Taskforce (Andersen, Arthur, Enterprise L.S.E. 2000), PFI appears to have worked well for roads, generating substantial cost savings, though it has worked less well for schools and hospitals.

5. Conclusion

When deciding to resort to a PPP contract for the provision of a local public service, local governments have to consider the demand risk allocation between the contracting parties. In this article I have studied the effects of demand risk allocation on the accountability of procuring authorities regarding consumers’ changing demands, as well as on the cost-reducing effort incentives of the private public-service provider.

The model and the evidence show that the contract form in which the private provider bears demand risk always dominates the one in which it does not bear demand risk regarding the incentives given to procuring authorities to be responsive to consumers’ concerns. As a consequence, I show that there is a lower matching of consumers’ preferences over time when demand risk is on the public authority rather than on the private provider. Thus, contracts in which the private provider does not bear demand risk rule out more the accountability – regarding service adaptations – of procuring authorities. As for the incentives given to the private provider to reduce costs, it is in turn the contract form in which the private provider does not bear demand risk that always dominates. A tradeoff occurs then between imposing demand risk on the private provider to raise the accountability of procuring authorities, and not imposing demand risk on the private provider to raise his cost-cutting incentives. In other words, there is a tradeoff in the allocation of demand risk between productive and allocative efficiency.

The striking policy implication of this article for local governments would be that the current trend towards a greater resort to contracts where private providers bear little or no demand risk may not be optimal. More particularly, the article
shows that local governments should impose demand risk on private providers when they expect that consumers’ preferences over the service provision will change over time. However, when there is a low uncertainty about consumers’ preferences as well as important benefits from cost-reducing investments, local governments should not impose demand risk on the private provider.

Notes on contributor

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Notes

1. Iossa and Martimort (2008) distinguish three types of PPP contract, depending on whether the payment is based on (i) user charges, (ii) usage, or on (iii) availability. In the first case, the private provider bears all demand risk. In the second case, the allocation of demand risk depends on the relationship between the payment and the actual usage level. In the third case, the public authority retains all demand risk. It is in fact contractually possible to restrict the demand risk imposed on the private provider (Athias and Saussier 2007), and, as a consequence, public authorities do not face a binary choice of contracts but a continuum choice. Whereas in this article I focus only on the two extreme contractual forms, considering a continuum choice of contracts does not question the results I obtained to the extent that the weaker the extent to which the private provider bears demand risk, the weaker the potential impact of the consumers’ pressure on its remuneration, everything else being equal.

2. Since in both contractual designs, PM has control rights over the service provision, e will be implemented unilaterally.

3. I assume in this article that the private provider has no private gains from implementing the adaptation, that is, the private provider’s adaptation incentives would not vary with the contractual design structures I analyse.

4. Thus, following Hart et al. (1997), I assume that the public authority does not maximise the global surplus during renegotiations: its utility function is given by the welfare of the rest of society, excluding the private operator. A justification for this is that the political process aligns the public authority’s and society’s interests (since the private operator has negligible voting power, his interests receive negligible weight). Of course, if the government placed the same weight on the private operator’s utility as on the rest of society, the first-best could be achieved.

5. I assume that PM’s additional cost of providing the adapted service is the same as for PM. Furthermore, I assume competition is such that PA needs only to compensate PM’s costs.

6. Recall that \( v(i) \) is PA’s net benefit, that is, entails the provider’s costs of adaptation.

7. Note that it is not necessary that the alternative provisions are adapted to consumers’ preferences. Consumers can in fact decide to switch to an alternative provision that can match their preferences even less, so as to sanction PM.
8. I abstract from the transaction costs of designing a contract in which demand risk is on the public authority compared to one in which demand risk is on the private provider, which when \( \lambda = 1 \) would favour the latter contract type.

References


Appendix

A. Proof of proposition 1

The first-order condition when the private provider bears the demand risk is

\[ v'(i) = \frac{2}{2 - \lambda k}, \]

or, equivalently,

\[ (2 - \lambda k)v'(i(\lambda)) = 2. \]

Taking the derivative with respect to \( \lambda \) yields

\[ (2 - \lambda k)v''(i(\lambda))i'(\lambda) - kv'(i(\lambda)) = 0 \]

Rearranging and solving for \( i'(\lambda) \):

\[ i'(\lambda) = \frac{kv'(i(\lambda))}{(2 - \lambda k)v''(i(\lambda))} \]

Since \( v \) is concave as well as \( 0 \leq \lambda \leq 1 \) and \( 0 < k < 1 \), the denominator is always negative and the numerator is always positive. Therefore, \( i'(\lambda) \) is always negative.

B. Proof of proposition 2

The first-order condition when the private provider bears the demand risk is

\[ w'(e) = \frac{2}{\lambda + 1}, \]

or, equivalently,

\[ (\lambda + 1)w'(e(\lambda)) = 2. \]
Taking the derivative with respect to $\lambda$ yields

$$(\lambda + 1)w''(e(\lambda))e'(\lambda) + w'(e(\lambda)) = 0$$

Rearranging and solving for $e'(\lambda)$:

$$e'(\lambda) = \frac{-w'(e(\lambda))}{(\lambda + 1)w''(e(\lambda))}$$

Since $w$ is concave as well as $0 \leq \lambda \leq 1$, the denominator is always negative and the numerator is always negative. Therefore, $e'(\lambda)$ is always positive.