Tendering universal service obligations in liberalized network industries

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TENDERING UNIVERSAL SERVICE OBLIGATIONS IN LIBERALIZED NETWORK INDUSTRIES*

Christian Jaag and Urs Trinkner

Abstract

In the past decades, several countries have introduced reverse auctions for allocating universal service or public mission subsidies in various industries. Examples include urban transport, air transport and telecommunications. Recently, such mechanisms have also been envisioned in liberalized postal markets. Issuing an invitation to tender for obligations in otherwise liberalized markets significantly differs from auctioning off a monopolistic provision of services or goods ("competition for the market"), as is e.g. the case with spectrum auctions in the telecommunications sector. We discuss the rationale for introducing such a regulatory regime as well as conceptual and practical issues concerning its implementation.

It turns out that designing an efficient tender for universal service subsidies in liberalized markets is considerably more difficult than tendering e.g. a monopoly franchise. A first reason is that the cost assessment is more complex in the former case as future competitive market outcomes have to be anticipated; in the case with franchise bidding, at least the number of competitors is given by the tender itself. Hence, revenue effects caused by competitors are easier to calculate. Second, the threat of a winner's moral hazard requires more detailed ex ante regulations. These raise the social cost of universal service provision. Compared to direct designation of universal services with ex post compensation, tendering causes a series of fundamental concerns and trade-offs that make the application of auctions less attractive than in other sectors.

Keywords: procurement; tendering; reverse auctions; universal service obligation; liberalization

* The views expressed are those of the authors and do not necessarily reflect the opinion of the institutions with which they are affiliated.

1. INTRODUCTION

In the past decades, several countries have introduced reverse auctions for allocating universal service obligations (USO) or public mission subsidies in different industries such as urban transport, air transport and telecommunications.[1] Recently, such mechanisms have also been envisioned in the postal sector. We discuss the rationale for introducing tendering as well as conceptual and practical issues concerning its implementation.

A reverse auction or tender[2] is a standard way in which governments procure any good or service. When a government needs to purchase something or provide it to the public, it issues a request for bids describing specifically what it wants. Firms submit proposals, and the government selects the firm with the best (lowest) bid. While it is easier to conduct a reverse auction for simple products, governments have also used them to purchase complex goods like defence systems or construction projects. This demonstrates that feasible auctions are not necessarily simple.

However, issuing an invitation to tender for obligations in otherwise liberalized markets significantly differs from auctioning off the monopolistic provision of services or goods ("competition *for* the market"). In the former case, the winning party must stand up to competitors without such obligations. This significantly adds to the risk taken by potential universal service providers, hence introducing additional cost, and raises some fundamental trade-offs.

Based on considerations about the calculation of the net cost of universal service obligations, we discuss the implications for tendering universal services. We cover distributional as well as allocative aspects and highlight trade-offs concerning the optimum design of such a tender.

The paper argues that – if operators participate in the reverse auction at all – the threat of a "winner's curse" situation combined with the operators' limited liability raises concerns about the sustainability of a tendering regime to ensure universal service. A further issue is the costs of regulatory restrictions that might limit future business options. Such costs can be predicted by use of (real) options theory. It turns out that these costs are higher under a tendering regime as governments must specify more detailed ex ante regulations to ensure a workable auction and to limit opportunistic behaviour of the winner ("winner's moral hazard").

We conclude that in many cases, self-provision or direct negotiation might prove more suitable than tenders.

The paper proceeds as follows. Section 2 provides an overview on the basic options available to governments in public procuring. Competitive tendering is one option that has to be assessed against a considerable number of criteria. Section 3 focuses on

1 Cf. e.g. Milgrom (1996).

2 We use "tendering", "reverse auctions" and "procurement auctions" synonymously.

tendering obligations in otherwise liberalized markets. We discuss efficiency properties and highlight basic trade-offs that arise out of tender mechanisms. In Section 4, we summarize the challenges involved in tendering universal service obligations in liberalized markets and provide our conclusions.

2. THE ROLE OF TENDERING IN PUBLIC PROCUREMENT

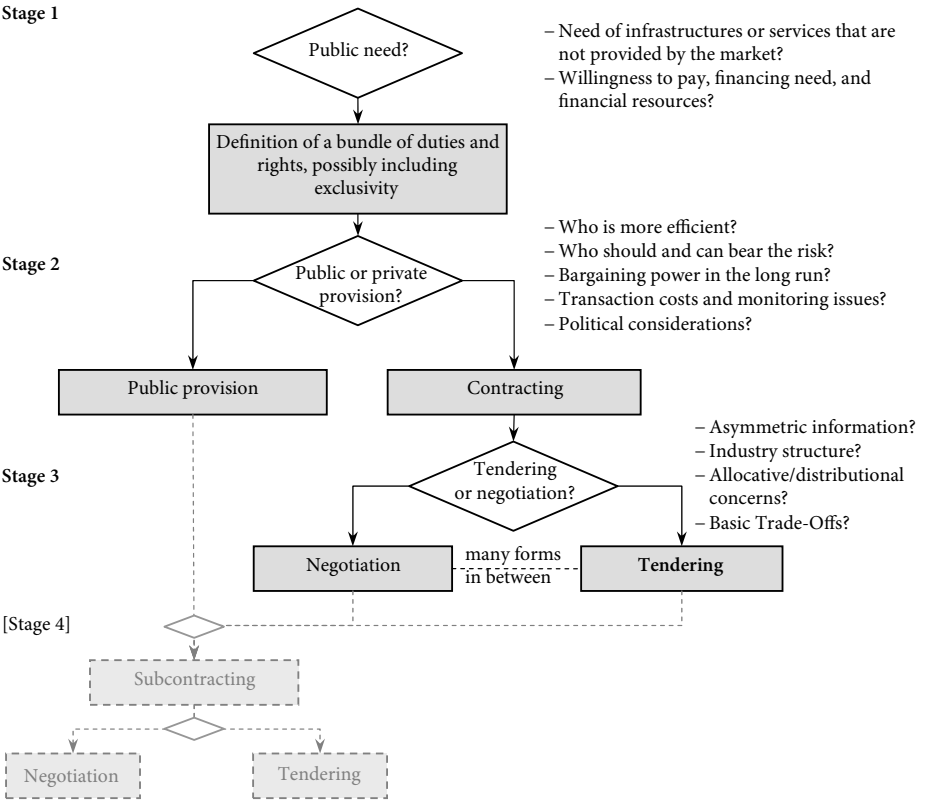
At the beginning of any public procurement, there is usually a public need that markets fail to satisfy.[3] The need might stem from a lack of infrastructures or services that a society as a whole (but not individuals) is willing to pay for. We do not further explore this subject and take it as a given that there exists a public need for services including an appropriate willingness to pay for those services (either by the individuals themselves and/or by society as a whole).

In such a situation, the state must ask itself how to best ensure the provision of the requested services. The major options are depicted in Figure 1.

In the first stage, a bundle of duties and rights has to be specified. The definition of the bundle is crucial and will determine the market structure and the financial burden imposed by the requested services/obligations. For example, the inclusion of exclusive rights has ambivalent effects: The need for state subsidies will be lowered at the expense of lacking competition within the tendered market. The definition of the bundle also determines the character of the mandate, e.g. in case of substantial exclusive rights a contract will resemble franchising rather than outsourcing. We will explore this issue in more detail in Section 3.1. In a second stage, a choice is necessary whether the bundle should be provided by the state itself or delegated to the market. In case of market delegation, the state can choose over various options including beauty contests and tendering in a third stage. Finally, in a fourth stage, the company mandated with the public mission can procure parts of its mission in turn.

[3] Such a situation is called a 'market failure' in the industrial organization literature.

Figure 1. Decision-Tree for Public Procurement



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2.1. CRUCIAL CONSIDERATIONS

2.1.1. Public Provision or Contracting? (Stage 2)

If a government has a mandate to provide certain services to the public that are currently not supplied by the market, it has two basic **options**: (1) *Public provision* by the state. This option is often chosen for critical goods such as police and military forces, or utilities such as water, electricity, or postal services which to date remain in the public domain in most countries. (2) *Contracting* for the requested services at certain conditions. The government can choose between direct negotiations with selected parties, beauty contests based on various selection criteria, or public tendering, where a market mechanism is implemented to choose the optimal candidate at the lowest cost. Public tendering has been successfully applied in large government

projects, e.g. construction ("construction bidding").[4] In recent times, tendering mechanisms have been increasingly and successfully applied in urban transport. Some attempts have been made in network industries but the results are ambiguous.[5]

The decision of the state over self-provision or contracting depends upon five main **criteria**. First, *efficiency* considerations should be made. Who will provide a certain service more efficient, a state run company or a private company? Thereby, expected cost structures are relevant, for example the presence of public-servant regulations that increase wages in the case of self-provision, possible economies of scope with other services (other government or private services) as well as capital costs and expected profit margins which are usually larger for private companies. Second, the *risk* bearing capacity should be considered carefully. For instance, large and risky investments over a long time horizon are usually not suitable for private companies. Compared to public enterprises, they have lower risk capacity and expect a market oriented (higher) risk compensation – otherwise investors would not invest. Generally, efficient contracting is easier to achieve if low investment risks are involved, i.e. good predictability of costs and earnings. Furthermore, the state should consider the effects on its long term *bargaining power* which can change over time. Among others, hold up risks and the possibility of a "winner's moral hazard" should be considered (cf. Section 3.3). If the threat of renegotiation of the contract is high, authorities might prefer self-provision of services.[6] Also, *transaction costs* are to be considered, e.g. the costs of periodically organizing a tender and the cost of properly monitoring the contracted quality of service. If proper monitoring is not possible and the necessary incentives are not possible to create, contracting might not be appropriate. Finally, *political considerations* have to be taken into account, i.e. should the state provide the service at all or would private service provision be more desirable to minimize the scope of the state.

2.1.2. Contracting: Direct Negotiation, or Tendering? (Stage 3)

In case of contracting there are various **options** at disposal. They range from *direct negotiation*, where a specific contract or service level is directly negotiated between the representatives of the state and a private enterprise, to *tendering*, where a bundle of rights and duties is publicly procured and virtually any candidate can apply for the

4 The WTO Uruguay round agreement on government procurement requires participant countries to tender certain government purchases. The agreement contains numerous provisions on the procurement process, including on the use of selected and invited tendering, the nature of technical specifications used in tenders, and the criteria to award contracts.

5 Cf. Calzada et al. (2010) for an overview.

6 Indeed empirically there is a large possibility that contracts will be renegotiated. Cf. Section 3.3.1.

contract.[7] There are various intermediate possibilities in-between those two extreme options, such as competitive dialogue, where a number of predetermined operators are selected and invited to make an offer ("beauty contest").

The main **criteria** at this stage are asymmetric information, industry structure, allocative and distributional concerns, and a number of basic trade-offs. The degree of *asymmetric information* determines how well the government can judge over the offers given by the candidates. If the knowledge is poor, a single candidate might overestimate the associated costs and underestimate future earnings. Note that, as in most principal-agent problems, a lack of knowledge of the principal (the government) is inherent. Tendering (is a means to overcome such information asymmetries by a market mechanism. It aims at introducing competition *for* the market. Potential operators are given incentives to uncover their true costs and enable governments to select the best offer (stemming from the most efficient operator). Hence, under competitive conditions, a tendering procedure might shed light on the true costs of (universal) service obligations and ensure an efficient allocation of public mandates among various potential providers.[8] The degree of competitiveness of a tender depends heavily on the specific *industry structure*, for example on the number of potential candidates. Only a sufficiently large number of interested operators will ensure a competitive tender that forces the contractors to uncover their true costs and hence an auction that resolves the issue of asymmetric information. This will rarely be the case in network industries, as they are characterized by considerable fixed and sunk costs, and market power or collusive behaviour might be an issue.[9] Third, the uncertainty associated with large tendering contracts entails *allocative and distributional concerns* (cf. Section 3.3). Fourth, tendering generates some basic and pertinent *trade-offs* (cf. Section 3.4). For example, investment incentives might be negatively affected. It turns out that, among other factors, it is of importance whether exclusive rights are granted or not. We will analyze these issues in more detail in the following sections.

2.1.3. Remark on Subcontracting (Stage 4)

Irrespective of the chosen options, state-run enterprises with public mandates as well as contracted private operators again have the possibility to subcontract parts of the mandate (as illustrated in Figure 1). Thereby, most of the options and criteria mentioned

7 Many different auction designs are at disposal. We won't discuss the issue in detail and refer to the specialized literature on auction theory. Calzada et al. (2010) provide a short overview in the context of auctions in network industries.

8 However, this does not solve the problem of moral hazard associated with providing services once the auction is won.

9 Vickers and Yarrow (1988) and Armstrong et al. (1994) have shown their skepticism about the use of auctions in presence of important sunk costs and have pointed out that the contacts should include mechanisms to account for future changes in the market. However, as pointed out by Williamson (1976), usually contracts are incomplete and cannot cover all possible contingencies.

above apply again. In other words, private and public outsourcing decisions are to a large extent alike from an economic point of view.[10]

2.2. CONCLUDING REMARKS

As all stages are interdependent, decision makers should take into account all stages simultaneously. In an ideal world, one could resolve the issue by backwards integration. One aspect with the most drawbacks is the definition of a bundle of duties and rights in the first stage. Note that in practice, tenders usually include exclusivity; auctions are used to allocate an entire market or submarket to one contactor which will face no competition within that market. However, in USO auctions in liberalized network industries this will not be the case. One operator will end up with duties whereas its competitors can do whatever they want. This situation changes the nature of the tender significantly, as we will see in the following section.

3. TENDERING USO IN LIBERALIZED MARKETS

Universal Service Obligations are a common policy for ensuring a public need which is not adequately satisfied by market forces. Contracting off the obligation to provide universal services implies altering the (optimal) market behaviour of at least one contractor by imposing binding constraints to its behaviour. Hence, universal service provision is costly for the providers[11] and for the society as a whole. The government has two basic options to impose the requested service level (universal service obligations) on the market:

(1) *For all*: The USO applies to any player in the market. All market players must fulfil all obligations or retreat from the market.
(2) *For one*: Market players must not meet the USO. Instead, a mechanism (for example tendering) is applied to designate one market player to provide the USO. The mechanism raises the issue of proper compensation for the designated operator who should not be worse off due to the obligations ("level playing field").

In order to minimize the economic cost of USO provision (or maximize overall welfare), it usually makes sense to impose a universal service obligation to one sole operator (option 2). Providing such services by several operators in parallel would yield an unnecessary multiplication of productive inefficiencies.

[10] Differences include political issues such as idea of state or the importance of direct client relationships in outsourcing decisions of private companies.

[11] Whether and to what extent the USO is compensated for its burden is then merely a distributional matter.

Hence, the question is how to select and compensate the universal service provider (USP). Auctions have the primary advantage to fulfil both tasks simultaneously at the same time in a transparent way (selection and determination of subsidy). In the following subsection, we discuss the relationship between the well known bidding for exclusive rights and tendering universal service obligations. Then, we focus on the intricacies of the latter.

3.1. TENDERING EXCLUSIVE RIGHTS VS. DUTIES

A key issue when considering public tendering as a means to delegate universal service obligations is whether the obligations are linked with substantial exclusive rights or not. Note that in most liberalized markets, tenders cannot include exclusive rights (by definition).

Auctions involving exclusive rights lead to competition *for* the market and essentially equal franchise bidding. Thereby, the procuring body has the possibility to extract monopoly rents.[12] As we focus in the paper on auctions involving no exclusivity, we will not develop the issue in more detail and refer the reader for franchise bidding in utilities to Harstad and Crew (1999) and for postal services to Borrmann (2004).

Without exclusive rights, i.e. if universal service obligations are tendered to one operator that afterwards will compete with other players in the same market, the latter not being restricted in its business decisions, things are more complicated.

From an operator's point of view, universal service obligations mean binding restrictions on product definitions, network size, quality level and pricing flexibility[13] that affect both cost structures and consumer demand. Ultimately, market shares are affected. Hence, compared to franchise bidding, business risks increase considerably, as the relative effects compared with other competitors have to be considered and quantified. The pricing mechanism is no longer available to finance extra obligations, as prices are determined in the market and hence uneconomic quality or product levels cannot be shifted onwards to consumers (in the form of higher prices) but must be paid by external funds (the operators bid in the procurement auction). Note that, as no exclusive rights are granted, operators that do not "win" the USO auction can still provide any service. Hence, operators willing to participate in a USO tender have to quantify the cost of the restrictions in a competitive setting imposed by asymmetric universal service obligations.

[12] However, one should carefully think whether this is appropriate and elaborate in detail the associated investment incentives and effects on overall welfare.

[13] In case uniform prices or affordability constraints are part of the USO.

3.2. KNOWING THE COST OF USO AND "NET COSTS CONCERN"

Auctioning off goods and tendering obligations for universal services in particular require that the bidders know the value or – in our case – the "net cost" they are bidding for (as a difference in profits resulting from a successful tender). In many countries universal services consist of a number of different, interacting dimensions that affect both costs and consumer demand. Typical dimensions include:

- **Product Range:** A list of products and services covered by the USO;
- **Coverage/Accessibility:** Requirements where, when and how these products must be available. Usually, services must be offered nationwide ("ubiquitous service") and be easily accessible;
- **Prices:** Restrictions in pricing. For example, prices must be cost-oriented, affordable, uniform, or provide incentives for efficient service provision;
- **Quality:** Minimum standards that must be met for the USO products;
- **Infrastructure:** Often, there are obligations to operate certain infrastructures. Examples include phone boxes or post offices.

When the obligation to provide universal services is tendered among competitors under perfect conditions, its cost is determined by the market. From a public point of view, there is no need of any USO calculation.[14] However, from a potential provider's point of view, the cost must be estimated for being able to submit a substantial bid.

There are a number of methods to calculate the cost or burden of the USO. For an operator, the methodology of Panzar (2000) is relevant which establishes that the cost of the USO is the difference of an operator's profit comparing a situation with and without USO.[15] Generally, the calculations are quite difficult and should include the various interactions between the different USO dimensions as well as the relevant intangible and market benefits which accrue to a universal service provider.

If tenders do not include exclusive rights, future competitive market outcomes have to be anticipated in addition. Under such circumstances, the following factors influence the net cost of universal service provision directly or indirectly:

- **Universal service obligation:** This is the most obvious factor. Dimensions include restrictions in product definitions, coverage/accessibility, pricing, quality, product definitions, and infrastructures. While single dimensions of USO may not be binding restrictions, it is often the combination of various aspects which limits an operator's strategic options and therefore constitute a net cost.[16]

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14 Still, the government might desire to estimate the cost of the USO in advance to ensure that the necessary funds are available. Similarly, if it anticipates that only a view operators will participate in the bid, it might define some maximum subsidies according to its own estimations.

15 An overview is provided by Oxera (2007) or Jaag, Koller and Trinkner (2009).

16 Cf. Jaag, Koller and Trinkner (2009) on the interactions of various USO dimensions.

- **Universal service provider:** The efficiency of the operator himself determines the burden directly.
- **Universal service financing:** There is an important link between USO costing and financing where the necessary funds are collected in the market place (for example by compensation funds). If the cost of the USO is calculated without considering the financing instrument in place, this might result in under- or over-compensation.[17]
- **Competitors**: The cost also depends on the competitors' strategies. If universal service provision include the operation of certain infrastructures, high competitive activity may result in inefficient operating scales which translate into net costs. Similarly, uniform pricing obligations might turn out costly if this fosters market entry in low cost segments of the market.
- **Regulation**: Also the regulatory framework (e.g. network access regulation, labour market regulations) influences costs and competitive pressure as this determines the market structure in which universal services are provided.
- **Technology**: The supply-side of the market is critically determined by the available technology. Depending on its evolution, the net cost of providing universal services may change dramatically over time.
- **Preferences**: Consumer behaviour constitutes the demand side of the market. If preferences change over time, this also affects the net cost of services.

Many of these factors are difficult to predict. In practice, calculating the cost of the USO in a liberalized environment is a difficult task even if it is done one a year by year basis.

Tendering renders the issue even more difficult. In network industries, contract periods typically range from 3 to 15 years. Hence, operators must anticipate the above factors for long periods of time. As opposed to the case of franchise bidding where the tender includes exclusive service provision, the number of future competitors is not known at the time of tendering. Still, it is necessary to correctly anticipate the yearly market equilibria during the contract period. Thereby, the winner faces asymmetric regulations that potentially hamper its commercial freedom. If market conditions change, important parts of the business are regulated and corporate flexibility is limited. This effect could (or should) be captured by the introduction of real options into the operators' profit functions. These real options increase in value with longer time horizons, greater uncertainty and fewer regulations and obligations that a company faces. Hence, uncertainty about the future will increase the (social) cost of the USO, as the winning operator must be compensated for the cost of the real option it is giving up. These costs are higher in auction mechanisms as these require – compared to direct USO designation with yearly ex post compensation – a suboptimal high level of detailed *ex ante* USO regulations.

[17] Cf. Jaag and Trinkner (2009) on the interaction between USO costing and financing.

Hence, a first concern is as follows: Relative to direct designation procedures with yearly ex post compensation of net costs, USO auctions increase the net costs of the USO.

3.3. DISTRIBUTIONAL AND ALLOCATIVE CONCERNS

Tendering aims to ensure a potentially "good" outcome in terms of efficiency (choosing the provider with the lowest cost) and distributive effects (paying him the least possible compensation). However, neither of these desirable outcomes is likely to emerge directly from a tendering procedure.

In the following, we first discuss the distributional concern; then the allocative concern. For illustration purposes, we assume that the net cost is a random variable whose distribution is known to the public.

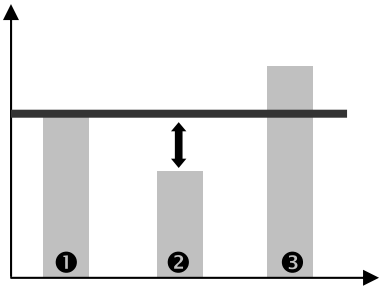
3.3.1. Distributional Concern: Winner's Curse or Winner's Moral Hazard

Tendering universal service obligations ideally guarantees that the winning bidder is not able to earn an excessive rent at the expense of the public. This is the major distributional concern.

Winner's Curse

Consider first a tendering situation in which each bidder knows his idiosyncratic cost of the universal service obligation being auctioned, but that information is private and independent of other bidders' information.

Figure 2. The winner's curse with homogeneous bidders



Source: Author's own.

For the simplicity of the argument assume that the cost of providing universal service would be the same for all potential providers, i.e. the cost is a "common value" (horizontal line in Figure 2). Hence, from the point of view of productive efficiency it does not matter who will win. However, the cost is not exactly known to the operators for the reasons outlined above. Under such circumstances, it is a well known result in auction theory that the bidder tends to call for a too low compensation ("winner›s curse"). Suppose that all bidders obtain an unbiased estimate of the real net cost (grey columns in Figure 2). If bids are a monotone function of this estimate, then the auction will select the bidder as winner who received the most optimistic estimate – bidder no. 2 in the Figure. But this requires the average winning estimate to be lower than actual cost. Hence, to play the auction right, such an adverse selection bias must be accounted for by the operators at the bidding stage by shading the bid to avoid bankruptcy.[18]

The winner's curse in common value auctions implies that an increase in the number of bidders has two opposing effects on the bidding behaviour: First, the increased competition leads to more aggressive bidding.[19] This effect is similar to the outcome in standard competitive situations and private value auctions (with a positive value) where increased demand through additional customers leads to higher prices. Second, bidders recognize that the potential for the winner's curse becomes more severe, which induces them to make larger upward adjustments to their cost assessment to avoid losses in the event they win. As a result, an increase in competition in our framework can lead to higher winning bids and therefore to higher public costs of universal service provision.

Hence, there are two possible outcomes from a distributional point of view:

1. If costs are equal among operators and they bid irrationally, the winner receives too small compensation for providing universal services.
2. If cost information is private or if operators bid rationally, they shade their bid and claim too much compensation which has to be financed via costly tax revenues.

Which of these outcomes is more likely? Milgrom and Weber (1982) discuss the possibility of the winner's curse and propose an empirical test: In a common value auction, with a higher number of participants, bidders will rationally lower their bids to prevent a winner's curse from happening, while in a private value ascending auction (or if participants bid rationally in a common value auction), the number of bidders should not have an effect on bids.

In their empirical model, Bajari and Hortacsu (2003) let each participant expect the distribution of the number of bidders in the auction to be a Poisson random variable, whose mean depends on auction characteristics such as the book value of the

[18] Bankruptcy might also be costly for the state and lead to renegotiations, hold-up problems, or re-tendering (which involves paying a bid again).

[19] Cf. e.g. McAfee and McMillan (1987).

object, and the minimum bid/reserve price policy of the seller. They find that for an average auction in their data set (i.e. when all variables, such as book value are set to their sample means), a bidder with an estimate equal to the average book value of $47.00 should only bid $41.50. I.e. bidders will, due to the winner's curse, reduce their bid by twelve percent. For an average auction on eBay, Bajari and Hortaçsu (2003) find that bidders lower their bids by 3.2% per additional competitor and that, hence, increased competition on the demand side does not reduce consumer rents. This evidence suggests that bidding on eBay can be characterized as a common value auction rather than a private value auction.

In a study on highway and bridge repair contracts Hong and Shum (2002) find that the average procurement cost is strictly increasing in the number of bidders. An increase in the number of bidders from three to six induces an increase in average cost of approximately 15%. This suggests that the common value component of highway construction projects is important and may lead to the winner's curse. Also, Hendricks et al. (1987) find in their analysis concerning auctions of Outer Continental Shelf leases that for many firms, the difference between the actual profits earned and those that would have been earned with optimal bidding amounted to hundreds of millions of dollars. They conclude that: "This result suggests that some firms may have systematically overvalued the tracts and/or failed to fully anticipate the impact of the winner's curse." (p. 529). Thaler (1988) presents further experimental evidence and field studies suggesting that the winner's curse is a common phenomenon.

Winner's Moral Hazard

In the examples discussed above, participants in auctions seem to behave sub-optimally at first glance as the winner's curse cannot occur if operators bid rationally (cf. Cox and Isaac, 1984). However, if a tender leads to a systematically underfunded provision of universal services, this will likely result in renegotiations of terms in favour of the winner. Once the auction is won, two scenarios are possible. If things work out, the winner gets a profit and keeps it. In case of underfunding, the government will be forced to renegotiate the contract. Clearly, the bargaining position of the government and the USP will depend on the government's USO replacement costs and the USP's equity at stake. Typically, the latter will be significantly lower in size and hence the USP's liability is limited. Hence, bearing in mind this possibility of renegotiation, asking initially for a low subsidy could not be so irrational after all.[20]

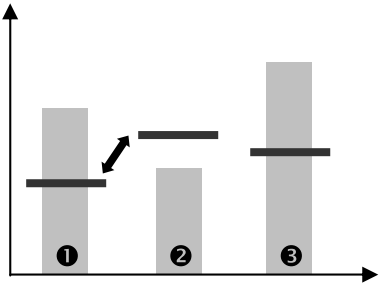
[20] Guasch, Laffont and Strauss (2002) analyze firm-led renegotiations in Latin America using data of 307 concession projects in the sectors of transport and water in Argentina, Brazil, Chile, Colombia and Mexico between 1984 and 2000. They show that more than half of these projects were renegotiated on average 3.5 years after signing the contract.

A second form of moral hazard relates to the winner's incentives for short term profit maximization. The operator that wins the auction may offer poor service, reduce investments, or find other ways to maximize short-run profits.

3.3.2. Allocative Concern

The second concern with tendering universal service obligations is related to the choice of the winning bidder. The objective is to choose the most efficient producer with the most efficient technology. Assume in contrast to the section above that all potential operators do not have the same net cost of providing universal services (horizontal lines in Figure 3). Then, from a welfare perspective, it matters who wins the auction. In our illustrative example, bidder no.1 would win ideally. Bulow and Klemperer (2002) show that common value auctions are almost always won by the bidder with the highest signal. In our setting, this leaves open the question whether it is the most efficient bidder who receives to highest signal. If information about future market outcomes varies, this is not guaranteed. Hence, universal service provision may be inefficient through the choice of a suboptimal production technology. In Figure 3, bidder no.2 receives the lowest signal and therefore wins the auction even though she does not have the lowest cost.

Figure 3. Bidding with heterogeneous bidders



Source: Author's own.

3.4. BASIC TRADE-OFFS IN DESIGNING A USO TENDER

The net cost, distributional and allocative concerns are inherent in a tendering procedure and cannot really be mitigated by optimal tender design. Apart from these, there are trade-offs to be considered when implementing a tender for universal service provision.

A first trade-off relates to the level of *concreteness* of the specific USO requirements. Detailed provisions on quality levels, accessibility criteria and so on are important for a correctly specified ex-ante contract that is in line with the need of the procurement

authority but might unnecessary hamper the commercial flexibility of the USO operator. Such detailed provisions get increasingly problematic with longer durations as customer behaviour changes over time. On the other hand, abstract USO definitions reduce both the operators' and regulator's legal certainty and provide only an unclear basis for any USO cost calculations. A loose level of regulations might also give room for quality reductions or strategic underinvestment.

A second and interrelated trade-off relates to the *duration* of the contract period. Typically, such contracts range between three and fifteen years. The longer the contract, the larger are the investment incentives for the winning operator (and vice versa). Switching cost play a minor role if the contract period is long enough. Similarly, the issue of sunk costs is less severe in relative terms. Otherwise, longer contract periods involve larger market risks: The burden of the USO is more uncertain to predict and the USO operator as well as the government have fewer possibilities to adapt the USO over time to the customers needs (renegotiations should be avoided for fairness reasons with respect to the succumbing parties in the tender). Recall that the value of the real option that the winner of the auction forbears increases with the length of the contract period and the intensity of regulations. Similarly, in the light of imperfect bidding markets, the government's risks are higher with long contract periods. In case of over-compensation, the contractor will insist that the contract will be fulfilled. In case of under-compensation (winner's curse), the contractor will renegotiate the contract or step down (winner's moral hazard). Hence, defining the optimal duration time of tendered contracts is a complex task. Longer time horizons might be needed for dynamic efficiency considerations but might result in higher compensation needs and risks.

A third trade-off involves the decision on the *level of aggregation*: Should the USO be tendered globally or divided up into various pieces and procured in various smaller tenders? A global approach has the advantage – apart from fewer transaction costs –, that economies of scale and scope can be exploited optimally. On the other hand, dividing the USO up into several pieces, for example various regions, enables yardstick competition which could result in a more transparent provision of the USO. However, such a disaggregated approach involves complex interconnection issues raising the costs of universal service provision. Moreover, system rigidities are introduced and increase over time, economies of scale and or scope are not exploited optimally, and brand advantages are lost.

A forth trade-off relates to the *ownership* of the incumbent operator starting from a situation with public ownership. For fairness and consistency reasons, tendering should come along with a full privatization of the formerly state-owned operator. Otherwise, conflicts of interests are prevalent and a level playing field between the various USO candidates is not guaranteed. However, privatizing might be more costly in the long run. If tenders result in over-compensation, the additional profits are not public anymore. In case of under-compensation, it is likely that the government will

need to enter into costly renegotiations (cf. winner's moral hazard above). In average, the government will need to spend more subsidies.

Note that those trade-offs are directly linked to tendering and do not apply for government self-provision. For the case of direct negotiation, some trade-offs can more easy be resolved than in the case of tendering.

3.5. ILLUSTRATION: RECENT USO "TENDERS" IN EUROPE

In practice, these concerns and trade-offs reveal themselves in applications of USO "tenders" in Europe where the standard reverse auction rules are changed considerably. In effect, they rather resemble direct designation than tendering. To illustrate, we (1) briefly present a recent Swiss subsidy auction in the telecommunications market and (2) discuss the most recent postal directive that allows for tendering.

The Swiss telecommunications Act[21] envisions competitive tendering of selected universal services. Such services include call boxes and most recently a nationwide provision of broadband internet based on ADSL technology. Thereby, no substantial exclusive rights are involved in the tender: The winner of the reverse auction will have to compete against competitors that can, regardless of the auction, provide the same services too. Interestingly the auction takes place even if the requested service level is already provided in the market. Hence the Swiss legislation lacks an ex-ante test whether there is a need for governmental intervention. If the best bid entails a subsidy request (if the obligations are binding this should be expected), the winner will be obliged to open its books such that the regulatory authority is capable to verify the winner's financial burden of providing universal services. This is somewhat in contrast to the economic reasoning of auctions that aim to reveal the lowest need of subsidies implicitly through competition (competitive tendering). Hence, the winner does not automatically receive its winning bit. Instead it receives a subsidy that the state considers appropriate based on net costs and "efficient service provision", i.e. the net costs cost of a hypothetical operator. Similarly, the operator with the best offer cannot be sure that it will be accepted as the winner. In case the regulatory authority asserts that the tender did not take place under "competitive circumstances", the law enables the regulator to ignore the result of the auction. Instead it can designate one operator for USO provision. In case the designated operator should ask for compensation in return, it must calculate the burden according to standards issued by the regulatory authority and open its books to proof the calculations. Once the authority accepts the compensation need, a compensation fund will be raised with contributions from all telecom operators (including the designated USO operator). Up to date there were two such "tenders" organized in Switzerland, the latest in 2007. Not surprisingly, in both cases only one applicant, the incumbent Swisscom, participated in the tender (more or

21 Fernmeldegesetz (FMG), issue of April 1st 2007.

less forced by its major shareholder, the government). Note that Swisscom did apply "for free", i.e. its bid was CHF 0 (to avoid opening its books in view that an eventual net compensation would have been negligible).[22] However, the regulator did not accept this (quite favourable) bid. Instead it cancelled the auction and designated Swisscom as USO operator giving it the right to request compensation subject to detailed calculation requirements and a stiff bill for the regulator's expenses. Swisscom announced that it would not request any compensation in the first 5 years of the concession.

The example illustrates the difficulties and concerns with USO auctions in practice. Similarly, the EC foresees USO tendering procedures in its fully opened postal market that might not accept the winning bid.

The third European postal directive (2008/6/EC) envisages full market opening by 2013 and allows for competitive USO tendering: Article 7(2) of the directive states that "*… Member States may ensure the provision of universal services by procuring such services in accordance with applicable public procurement rules and regulations*". The meaning of subsequent Art. 7(3) in relation to the tendering option is somewhat unclear. The article states that state subsidies or compensation funds might only be implemented if a "net cost" arises. These shall be *verified by the national regulatory authority* subject to detailed accounting requirements. As they stand, these provisions imply that the successful bid might not be accepted *per se*. The designated USP will receive a subsidy equal to its bid only if detailed computations of the regulator lead to the same result as the auction. As a consequence, operators participating in the bid are aware that winning the auction means opening the books to the regulator. This might not be an attractive prospect. The EC provisions can be interpreted as a presumption that reverse auctions will likely not result in efficient subsidy levels in the postal sector. So far, no subsidy auctions have been organized under the postal directive framework. In Germany, a tendering mechanism for universal postal services was implemented in 2008 when the market was completely liberalized. In the case that certain USO elements are not provided by the market, the law foresees to auction the lacking USO elements. Such "incremental subsidy auctions" might result in more bidders – and eventually in a USO provision that is less costly. However, as the subsidy auction is defined relative to Deutsche Post's service plans, it would be astonishing to find another operator with smaller incremental costs. Hence, one might start negotiations directly with Deutsche Post instead of organizing a costly auction.

In contrast to these examples, subsidy auctions seem to work much better in developing countries.[23] In these tenders, the requested universal services have usually

22 Partly because of the design of the compensation fund which would have been mainly stocked by Swisscom itself. Generally, the inclusion of the incumbent translates to underfunding of the USP unless the net cost calculation include the effects of the financing instrument, see Jaag and Trinkner (2009).

23 Cf. Calzada et al. (2010) for an overview.

not been provided yet and therefore the winner receives quasi-exclusive rights in the procured regions. These observations support the conclusion that the inclusion of exclusive rights is crucial for successful USO tenders.

4. SUMMARY AND CONCLUSION

We discussed the procurement and competitive tendering of universal service obligations. We conclude that tendering obligations is an inherently difficult task in liberalized network industries.

Tendering is one option out of many to allocate universal service missions to an operator. Based on findings in the relevant literature, we highlighted the implications of tendering on investment as well as the cost and the sustainability of universal service, and the allocative and distributional efficiency of its procurement. Moreover, we discussed issues concerning the optimum design of such a tender. Tenders raise three fundamental concerns and a series of basic trade-offs concerning the duration of the contract period, the level of aggregation and concreteness of the USO contract as well as the legal status of potential universal service providers.

Network industries like telecommunications and posts have traditionally been characterized by state-run operators that had a public mission to provide the universal services. Such obligations were compensated by granting extensive exclusive rights. Auctioning universal service contracts brings higher risk to the market, not only for the winner but all competitors. Furthermore, auctions raise the need for more detailed ex ante regulations. Consequently, if contract periods are long, this again translates into higher risks for the designated universal service provider. These risks have to be compensated and will result in high public costs of universal service provision. Furthermore, it remains open how to resolve labour and infrastructure issues in case a well and traditionally established incumbent operator loses the tender.

Introducing a tender entails various political and economic challenges:

First, a fair and proper way of USO tendering involves the loss of control rights of the government in its former public undertaking that was previously granted a monopoly to finance the USO. More specifically, fair and consistent tenders require full privatization of the former incumbent, otherwise a level playing field is not ensured and various conflicts of interest remain. Hence governments must ask themselves whether they are ready and able to privatize their state-run undertakings properly.

Second, USO tendering requires that the state has the necessary funds and willingness to pay the winner of the auction the bidding price. Otherwise, USO requirements should be redefined in a market-oriented way to ensure that these are not binding and costly.

Third, tenders increase information asymmetries between governments and contractors. Hence, the relatively loose and open missions of the state-owned enterprises must be replaced by detailed, precise and measurable USO provisions. These are by necessity more static as they must be specified ex ante for the whole duration of the contracting period. Any changes of the contracts should be compensated.

Fourth, governments must be aware of the hold-up risk and moral hazard issues that are involved in tendering. In case the winner of the auction did underestimate the cost of the USO or more general in case of bankruptcy of the contractor, the government loses its invested compensation funds. Moreover, providing the operator in trouble with additional funds ("renegotiating") might by optimal for the government as the alternative, organizing a new auction, might be more costly and result in temporary USO under-provision. In anticipation of such opportunistic behaviour USO contractors have hold-up incentives. Other opportunistic behaviour includes short run profit maximizing by reducing quality or strategic underinvestment.

Fifth, and independently of strategic underinvestment, tendering will lead to lower investments into universal services; *ceteris paribus*, investments and projects have a lower net present value (cash flows after the end of the contract must be discounted by a larger factor).

We conclude that tenders are not *a priori* an ideal mechanism for procuring public services in liberalized and developed markets. Compared to other ways of delegating universal service obligations to the market, subsidy auctions raise a number of important concerns an trade-offs. The design of a tender should consider sector-specific aspects, such as innovation and changing consumer needs. One size will not fit all. In order to ensure the frictionless function of universal service in liberalized markets, these issues should be thoroughly assessed and resolved before introducing a tender or other procurement mechanisms. In many cases, self-provision or direct negotiation might prove more suitable than tenders.

BIBLIOGRAPHY

Armstrong, M., S. Cowan and J. Vickers. (1994) *Regulatory Reform – Economic Analysis and British Experience,* Cambridge, MIT Press.

Bajari, P. and A. Hortacsu. 2003. *"The Winner›s Curse, Reserve Prices, and Endogenous Entry: Empirical Insights from eBay Auctions",* Rand Journal of Economics 34, 329–355.

Borrmann, J. 2004. "*Franchise Bidding for Postal Services in Rural Regions*", Topics in Economic Analysis & Policy 4(1), Article 10.

Bulow, J. and P. Klemperer. 2002. "*Prices and the Winner's Curse*", Rand Journal of Economics 33, 1–21.

Calzada, J., C. Jaag and U. Trinkner. Forthcoming 2010. "Universal Service Auctions in Liberalized Postal Markets". In *Heightening Competition in the Postal and Delivery Sector*, edited by M.A. Crew and P.R. Kleindorfer. Cheltenham, UK, Edward Elgar.

Cox, J.C., and I.R. Mark. 1984. "In Search of the Winner›s Curse", *Economic Inquiry*,22(4), 579–92.

Harstad, R.M. and Crew, M.A. 1999. "Franchise Bidding without Holdups: Utility Regulation with Efficient Pricing and Choice of Provider," Journal of Regulatory Economics, Springer, vol. 15(2), pages 141–63, March.

Hendricks, K., R. Porter, and B. Boudreau. 1987. "*Information, Returns, and Bidding Behavior in OCS Auctions: 1954–1969*", Journal of Industrial Economics 35, 517–542.

Hong, H. and M. Shum. 2002. "*Increasing Competition and the Winner's Curse: Evidence from procurement*", Review of Economic Studies 69(4), 879–898.

Jaag, C., M. Koller and U. Trinkner. 2009. "Calculating the Cost of the USO – The Need for a Global Approach". In *Progress in the Competitive Agenda in the Postal and Delivery Sector*, edited by M.A. Crew and P.R. Kleindorfer. Cheltenham, UK, Edward Elgar, pp 113–127.

Jaag, C. and U. Trinkner. 2009. *Would the real net cost of universal service provision please stand up? – A calibrated approach to universal service costing and financing*, Working Paper, presented at the 17th Conference on Postal and Delivery Economics in Bordeaux.

Klemperer, P. 1998. "*Auctions with Almost Common Values*", European Economic Review 42, 757–69.

McAfee, R. and J. McMillan. 1987. *Auctions and Bidding*", Journal of Economic Literature 25(2), 699–738.

Milgrom, P. 1996. *"Procuring Universal Service: Putting Auction Theory to Work"*, Lecture at the Royal Swedish Academy of Sciences.

Milgrom, P. and R. Weber. 1982. *"A Theory of Auctions and Competitive Bidding"*, Econometrica 50, 1089–1122.

Oxera. 2007. *Funding Universal Service Obligations in the Postal Sector*. Study on behalf of nine European Postal Operators.

Panzar, J. 2000. "A Methodology for Measuring the Costs of Universal Service Obligations". *Information Economics and Policy* 12:3, 211–220.

Thaler, R.H. 1988. "The Winner's Curse", *Journal of Economic Perspectives*, 2(1), 191–202.

Vickers, J. and G. Yarrow. 1998. *Privatization: An Economic Analysis*, Cambridge, Massachusetts, and London, England.

Williamson, O.J. 1976. Franchise Bidding for Natural Monopoly: in General and with Respect to CATV, *Bell Journal of Economics*, Volume 7, Number 1, Spring, pp. 73–104.