



A theory of BOT concession contracts

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ABSTRACT

In this paper, we discuss the choice for build–operate–and–transfer (BOT) concessions when governments and firm managers do not share the same information regarding the operation characteristics of a facility. We show that larger shadow costs of public funds and larger information asymmetries entice governments to choose BOT concessions. This result stems from a trade–off between the government’s shadow costs of financing the construction and the operation of the facility and the excessive usage price that the consumer may face during the concession period. The incentives to choose BOT concessions increase as a function of informational asymmetries between governments and potential BOT concession holders and with the possibility of transferring the concession project characteristics to the public authority at the termination of the concession.

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1. Introduction

In the last two decades, many governments have increased their reliance on public–private partnerships (PPP) to finance the acquisition of infrastructure assets and the operation of their facilities. A frequent form of PPP is the build–operate–transfer (BOT) concession under which the private sector builds and operates an infrastructure project for a well defined concession period and then transfers it to public authorities. In a majority of cases, such concession contracts have been used to finance transport infrastructure such as highways, tunnels, airports, ports, bridges, canals, railroads and railway transport systems. They are also frequently used to finance projects in power generation, water supply, dams, irrigation, sewerage and drainage, and to a lesser extent, solid waste management and telecommunications infrastructure. Despite their popularity and practical relevance, few academic works have studied BOT concessions. This paper intends to fill this gap by offering a theoretically investigation of these contracts.

The attractiveness of BOT concessions to governments and politicians stems from the possibility to limit government spending by shifting investment costs to private interests. Historically, the first BOT concessions were granted for the construction of turnpike roads in the UK in 1660, at a time of industrial expansion and embryonic public finances. Additional BOT concessions quickly followed for the construction and operation of canal and railway projects in both the UK and the US. In the water sector, the first French BOT concession was granted to the Périer Brothers in 1782 to pump and supply water to the city of Paris. It was quickly followed by similar concessions in France, Spain, Italy, Belgium, and Germany. The need

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to resort to private investors has been even more acute for international projects that require important funding commitments and challenging coordination amongst nations. This is the case of the Suez Canal and Channel Tunnel projects, which construction and operation were privately financed by the Suez Canal Company in 1859 and the Eurotunnel Group in 1988, respectively.

To induce private investors to sink their capital into very expensive and risky infrastructure projects, governments must leave rents to the concession holders during their activities. In the 17th and 18th centuries, many concessions were unregulated so that concession holders were given monopoly rights over their infrastructure. For example, some canal concession holders retained exclusive rights on the fleet moving on their canals. Nowadays, even when they are monitored by public authorities, BOT projects confer temporary control and cashflow rights to the private concession holders. The latter are indeed allowed to ask compensation from the users of the delivered goods or services and aim not only at recovering their investment costs but also at extracting the highest possible profits. Therefore, the choice between a private BOT concession and public management implies a trade-off between allocative efficiency and the cost of public funds, which is the focus of this paper.

Among concession contracts, a distinctive feature of BOT concessions lies in the transfer of operational responsibilities and profits to a private concession holder for a well defined time period. Concession periods vary in function of the time required to recover the assessed costs of the facilities. For example, in the above historical examples, the Périer Brothers obtained a 15-year concession (Delambre, 1818, p. lxiij.), and Suez Canal Company a 99-year concession. The Eurotunnel Group has (initially) obtained a 55-year concession (Channel Tunnel Act, 1987). As additional examples, the French Millau bridge was granted a 78-year concession, Australian Darwin–Alice Springs railway concession has a 50-year duration, the US concessions for the Southern Indiana Toll Interstate 69 and Trans-Texas road Corridor are granted for 75-year and 50-year respectively (Congressional Budget Office, 2008). Since concession periods vary with the nature and context of the projects, the present paper also aims to discuss the optimal concession periods.

Finally BOT concession contracts are close substitutes to build–own–operate–transfer (BOOT) contracts where the concession holder gets the ownership of the infrastructure in addition to the tasks to build and operate it. In BOT contracts, the public authority retains ownership over the infrastructure while it contractually confers *all* control and cashflow rights to the concession holder (e.g., the above French Millau bridge and US toll road examples). In BOOT contracts, the authority confers the ownership over the infrastructure to the private concession holder (e.g., Suez Canal, Channel Tunnel and Australian Darwin–Alice Springs railway).¹ The choice between one or the other contract generally depends on the legal system that applies to the project. Nevertheless, from an economic viewpoint, the two forms of concession contracts are equivalent as long as they are associated with the same control and cashflow rights (Hart, 2003). In the sequel, we will therefore make no formal distinction between BOT and BOOT contracts.

In this paper, we present a simple theory of BOT concessions by considering a single project that can be implemented by a public firm's manager or a private concession holder. In the case of a publicly owned firm, the government makes the investment and keeps both cashflow and control rights over the infrastructure. The government is, therefore, accountable for its profits and losses. The government must subsidize the public firm in the event of losses, whereas it can tax it in the event of profits. In contrast, the BOT concession combines private and public management. The government auctions the BOT concession to potential concession candidates, who bid for the shortest concession period. During the concession period, the winning concession candidate keeps cashflow and control rights so that the government takes no responsibility for the firm's profits and losses. The government therefore makes no cash transfer to concession holders during the construction and operation periods. The concession holder recoups its investment cost from the firm's profits during the concession period. For the sake of simplicity, we assume in most of the text that concession holders are allowed to set monopoly prices during the concession period.² However, our results are robust to the possible existence of a price cap. Finally, at the end of the concession period, the government recovers the cashflow and control rights and delegates the operation to a public firm's manager.³

We discuss the choice of BOT concession contracts for various degrees of information asymmetry that exist between firms and governments before the concession contract and for various levels of transferability of project characteristics at the end of the concession period. Our discussion is structured around two main cases. In the first case, concession candidates do not hold any better information about project characteristics before the concession contract signature (ex-ante information symmetry). As in the examples of the Suez Canal or Channel Tunnel, public authorities and concession holders may be equally uncertain about costs and demand prospects. In the second case, concession candidates hold better information before the concession contract signature (ex-ante information asymmetry). For instance, many water distribution and sanitation concessions are held by specialized multinational corporations that have better technology expertise and project experience than local governments. We then also consider two subcases depending on whether project characteristics may or may not

¹ From a legal viewpoint, the latter option offers more protection to the concession holder as it limits the government's legal public authority to unilaterally change a concession contract. However, in practice such unilateral actions are rather infrequent. We thank the editor for this remark.

² This is congruent with the fact that many outsourced facilities turn out to show excessive usage prices. See for instance Chong et al. (2006) and Estache (2006).

³ In this paper we assume away possible renegotiation of the concession duration for simplicity. In practice BOT contracts are nevertheless regularly renegotiated (e.g., see Guasch et al., 2008). For instance, the channel tunnel project was allowed to extend its initial 55-year concession by 10 additional years (Channel Tunnel Act, 1987).

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