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Applying social marginal costs pricing to the road sector

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A B S T R A C T

This chapter, following the results of the case studies analyzed in the Enact project, will identify and analyze the implications of the possible application of SMCP in PPP's in the road sector. The main issues analyzed include SMCP revenue formation and its ability to finance the PPP. The paper will focus on market and competition issues like: 1) the problems due to mispriced substitutes; 2) the interdependencies between the tolls and the capacity of different road infrastructures when these are competing for the same demand; 3) since short run social marginal costs do not repay for the investments costs (except in special cases), in the case tolls should cover also the investment costs this will lead to totally different pricing schemes between roads in a same area, with problem of demand shift toward cheaper existing infrastructures, therefore increasing the problem of cost recovery. The incentives caused by the introduction of prices based on SMC's are also investigated.

1. The case studies

The case studies analyzed were two motorways in Northern Italy, the Lisbon area motorway concessions and the new road the new road between Klett and Bårdshaug south of Trondheim in middle Norway.

The two Italian motorways include an already existing one, linking Piacenza with Brescia, and a planned one the new Brescia-Milano motorway link. The motorway was planned to provide a direct connection between the cities of Brescia and Milano, in order to improve the regional transport mobility and alleviate the congestion on the existing motorway A4 and is expected to open in 2013. The new motorway is located in one of country's most densely populated area hosting a large number of economic activities. The motorway will be constructed and operated on the basis of a PPP, the private company Brebemi Spa has been awarded a concession from the public stock company named CAL Spa (Concessioni Autostradali Lombarde Spa) to finance, construct and operate the new motorway for a period of 19.5 years (from 2013 to 2032).

All construction costs as well as operating and maintenance costs are shouldered by Brebemi Spa. The main source for Brebemi Spa to recover and remunerate its investments is the revenues deriving from the user charges. No public contribution will be given during the construction period. However, it has been set a final compensation (i.e.: the asset residual value) at the end of concession.

The Piacenza-Brescia motorway (A21), crossing the South-Eastern part of Lombardy even if the city of Piacenza belongs to Emilia Romagna, is about 89 km long and at its edges it is connected to other important motorways: at Piacenza with the A1 motorway (Milano-Napoli), at Brescia with the A4 motorway (Torino-Venezia).

The PPP concerns only the infrastructure management, since the motorway was constructed during the seventies and the investment costs have already been recovered. All operating and maintenance costs are shouldered by the concessionaire, whose main source to recover the costs is the revenues deriving from the user charges. Although there are still ongoing investments, currently a specific plan for these investments, including the relative costs, is not available, therefore investment costs have not been considered in the analysis. Presently, the motorway is managed by a private company named Centropadane Spa. Despite the current concession is going to expire in a couple years, for the purpose of the study it has been assumed that up to 2038, the motorway will be operated under the same conditions envisaged in the present concession. Since many motorways in Italy are currently operated according to the same conditions and their concessions will last for several years, this assumption has been considered reasonably realistic.

Lisbon Area motorway concessions are the Grande Lisboa concession, to the Northwest side of the city, and the Baixo Tejo concession, in the South margin of the Tagus River. Since the early seventies the engagement of private agents in the construction, operation and maintenance of motorways has been an important instrument for the expansion of the Portuguese Motorway Network. The Grande Lisboa Concession was awarded to "Lusolisboa

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Table 1
Summary of types of PPP's of case studies.

	Real PPP?	Greenfield/ Brownfield	Type of operation activity	Contract duration	Responsibilities			Revenues		
					Build	Operate & Maintain	Upgrade	User charges	Public funds	Other
Brescia-Milano	X	G	IM	19,5	X	X		X		X
Piacenza-Brescia	X	B	IM	30*		X	X	X		
Grande Lisboa	X	G/B	IM	30	X	X	X	X		X
Baixo Tejo	X	G	IM	30	X	X	X		X	X
Orkdalsvegen	X	G	IM	25	X	X			X	

IM: Infrastructure management; operation; G: Greenfield; B: Brownfield.
* period assumed in the case study analysis.

– Auto-Estradas da Grande Lisboa, S.A." in January 2007, through a public tender. The contract comprises both green and brown-fields PPP arrangements. First the conception, construction, doubling of the number of lanes, financing, operation and maintenance of about 23.2 motorway km in a real toll regime for a 30 year period; then the operation and maintenance of 68.1 km, most of which already under operation for a 5 year period. The execution of this project carries a total investment of 170 million Euros. The main source of revenue of the concessionaire is from the motorway's tolls.

The "Baixo Alentejo" Concession was awarded to the "AEBT - Auto-Estrada do Baixo Tejo" (a private consortium) in November of 2007, for a period of 30 years. The focus of the "Baixo Tejo" Concession is to develop a regional ring, with a total extension of about 70 km, with a huge capacity in the southern bank of the Tagus River in order to interconnect the corridors of the three road bridges that cross the Tagus River in the Lisbon area. Two of these crossing bridges are already built and the third one is expected to be completed within a few years. This concession requires an initial investment of about 255 million Euros on 32 km of new motorway and on the expansion of the number of lanes of 38 km of existing roads. The concession also comprises the operation and maintenance of the entire link. The concession is not remunerated directly through toll charges (only about 24% of the road will have real tolls), its main source of revenue is availability payments.

The Orkdalsvegen project was set in operation in 2005. The Orkdal road goes from Klett outside the Trondheim (Norway third largest city) to Bårdshaug close to the small town centre of Orkanger, extending mainly through the municipality of Orkdal. The purpose of the road project is to relieve, but not to totally replace the old road that previously was the only choice. The Orkdalsvegen is owned by Skanska BOT and Laing Roads Ltd (later Skanska ID AB and John Laing Infrastructure) by 50% each. Skanska Norway is the main contractor concerning both construction and operation/ maintenance.

The main lending institutions are private banks and The Nordic Investment Bank. The contract states that "Orkdalsvegen", the PPP Company, has been contracted to deliver the specified road, Klett-Bårdshaug, and to operate and maintain it for 25 years. Part of the contract is also a three part agreement between the Norwegian Road Administration (representing the Government in all PPP matters), the PPP Company and the lending banks. A special feature of the Norwegian payment model is that the Government is paying all of the remuneration and is taking the income risk, while leaving the cost risk to the private partner. There is no direct link between the toll revenues, which go directly to the State, and the size of the remuneration to the PPP Company. The remuneration model consists of five parts: payment for availability, payment for quality, payment for large traffic increase, payment for traffic safety, early payment of construction costs. The Government is thus taking nearly all the revenue risk concerning traffic volume Table 1.

2. Main problems concerning the introduction of SMC pricing

The application of SMC pricing is only guaranteed to achieve its objectives of social optimal travel choice behaviour if it is applied broadly over all the relevant competitor transport services. Otherwise, the effects of its application may even reduce welfare, under some conditions. Secondly, if second-best pricing solutions are applied with the aim of achieving cost recovery, traffic allocation distortions also need to be checked carefully.

The case studies provided some insight into the market situation in which the transport activities under analysis are located, and its consequences on introduction of SMC pricing and second-best pricing solutions.

2.1. Competition issues and SMC pricing

The Orkdalsevegen is the simplest case. The new motorway was built to be an alternative to a single old road. Still, it is expected that demand may have some elasticity to price. Overall, it is likely that the single introduction of SMC pricing in the motorway would not cause major distortions, unless a toll mark-up is too high.

On the contrary, the Brescia-Milano motorway is far from being an isolated infrastructure, but it is rather a part of a wider complex transport network. In this situation, it was suggested in the case study that a successful application of the social marginal cost pricing should not involve only the new motorway, but it should consider the wider road network and also other transport modes. As far as competition within the road market is concerned, traffic modelling simulations carried out by the case study demonstrated that the application of SMC pricing at the network level could lead to substantial changes in demand allocation.

Despite standing on opposed sides of the city, the Lisbon Area concessions have similar market conditions. Both compete with other non-tolled motorways and, in much less extent, with railway services. Although the competitor roads do not fully share target demand, it is likely that an isolated application of SMC pricing would conduct to significant market distortions.

The first-best choice is to extend the scope of the pricing system as far as possible. In the case of Lisbon Area concessions, SMC pricing should therefore be implemented at least in the road alternatives as well. However, where competition does exist, but for some reasons SMC pricing cannot be applied to not tolled alternatives, second-best tariff can be much harder to estimate than first-best taxes[1]. This is the case of the Italian motorways, namely of

[1] The reason for this complexity is that "the optimal second-best taxes have to reflect all sorts of direct and indirect interactions, which may run both via the cost-side and the demand-side, between users from different OD-pairs, routes and links" (Rouwendal J., de Borger B., de Palma A., Lindsey R., Niskanen E., Pels E., Proost S., Verhoef E., Relevant Optima and Constraints, MC-ICAM Deliverable 2, 2002).