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Infrastructure pricing and capacity investment in the case of Private Public Partnerships:
An application to the Lyon-Turin HSL project

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Abstract
The Lyon-Turin project consists in a mixed high speed line, both for passengers and freight, between Lyon and Turin, crossing the Alps through a 50 kilometres tunnel. The aim of the project is to reduce the transit time for passengers between Lyon and Turin but also to reduce the transport cost for freight trains in order to increase the modal share of rail transport in a “sensible” area like Alps. The project will be realised by a joint-venture company, Lyon-Turin Ferroviaire (LTF), shared fifty-fifty by the French railway infrastructure manager (RFF) and the Italian railway infrastructure manager (RFI). The international agreement between the French Government and the Italian Government envisages an international public-private partnership (PPP) in order to reduce the public subsidy and to encourage the participation of private capitals. The investment cost amounts to about 20.5 billion of Euros and the freight traffic capacity is estimated at about 40 million of tonnes per year. The construction works will start in 2014 and will last about 12 years.

According to traffic surveys⁴ and demand forecasting studies, the most part of the traffic flows interested by the project are concentrated on the north-south axes, in particular between the Northern Italian industrial regions on one side and North France

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⁴ In particular the Cross-Alpine Freight Transport Survey.
and Benelux on the other side. Furthermore, to increase the modal share of railway transport, Switzerland has introduced a special charge on freight road transport. The income of this charge contributes to some major railway investments, known as the “AlpTransit project”, which includes the new Lötschberg tunnel (35 km), already in operation, and the new Gotthard tunnel (57 km), under construction. The investment cost of AlpTransit amounts to about 23 billions of Euros and the freight traffic capacity is estimated at about 50 million of tonnes per year.

As the distance is comparable between the two itineraries, the realisation of the Lyon-Turin HSL could provide a real alternative for traffic flows between Italy and North France/Benelux. Finally, the route choice depends on transport cost which includes, for the railway operator, the amount of the railway infrastructure charges required by the railway infrastructure manager. In the case of the Lyon-Turin HSL project, the demand reaction function depends not only on the competition between rail and road on the same itinerary, but also on the intra-modal competition between the two different railway itineraries, based on the amount of the railway infrastructure charges. This could introduce a “pricing game” between the French railway infrastructure manager (RFF) and the Swiss railway infrastructure manager in order to maximise the welfare function and finance new capacity investments. In the case of RFF, the optimal pricing strategy will therefore determine the amount of the public subsidy for the Lyon-Turin HSL project.

This paper attempts to assess the effects of this potential “pricing game” on the level of public subsidy needed to fund the Lyon-Turin HSL project. Based on the model of Bonnafous (2009), we first calculate the pricing schemes decided by the French and the Swiss authorities, with respect to the objective function they follow (either to maximize the social surplus or to maximize the toll revenues) and by ignoring the strategic behaviours of players. Using the model of De Borger, Dunkerley and Proost (2008), we then calculate the “Nash equilibrium toll” in the case of parallel links and zero local demand. This helps us to determine the level of the public subsidy for RFF in the Lyon-

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5 For example the distance between Milan and Brussels is about 900 km through Switzerland, and about 1150 km through France. The distance between Milan and Paris is about 900 km on both itineraries.
Turin HSL project in the presence of strategic behaviour of the Swiss authority. Our numerical results show that the level of public subsidy necessary to fund the Lyon-Turin HSL project is slightly affected by the “pricing competition” between the French and the Swiss authorities. Indeed, the difference between the benchmark case (without “pricing game”) and the “strategic case” amounts to a 30 millions euros gap in public subsidies. Our sensitivity analysis underlines the importance of a precise parameter: the opportunity cost of public fund. Depending on the retained values, the welfare effects of the Swiss and French projects vary considerably.

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