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Infrastructure investment and optimal access regulation in the different stages of telecommunications market liberalization

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ABSTRACT

In this paper, we compare the optimal access regulation under three different market configurations that approximate the different stages of telecommunications market liberalization. We show that in the first stage of market liberalization the regulator has to balance between static efficiency and investment and that the optimal access price may be above marginal cost. In the second stage, two different outcomes are possible. If entrants tend to underinvest, the regulator balances between static efficiency and investment. If entrants tend to overinvest, the regulator sets the access price as low as possible in order to prevent or limit infrastructure duplication. Interestingly, we find that in the third stage of market liberalization the regulator may decide to promote infrastructure duplication and to set the access price above the price in the first stage of market liberalization, even if telecommunications network operators tend to overinvest in infrastructure duplication.

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1. Introduction

Access regulation, i.e. the requirement for the firms that own essential facilities to provide access to other firms at a regulated price, is a key instrument for promoting competition in network industries. However, asking firms to share their infrastructures with rivals may significantly undermine their incentives to invest. Since maintaining and developing network infrastructures call for large capital expenditures, the impact of access regulation on investment is a key issue. For example, in telecommunications, it is often argued that although local loop unbundling is required to avoid remonopolization, the access price should be high enough to preserve the incentives to build next generation networks.

Our paper contributes to the growing literature on access regulation and infrastructure investment. Specifically, we compare the optimal access regulation under three different market configurations that approximate the different stages of telecommunications market liberalization. We consider that in the first stage of market liberalization an entrant cannot build her own facilities and that only an incumbent may invest in a new infrastructure. In the second stage of market liberalization, an entrant either accesses the existing infrastructures or builds her own facilities. In the third stage of market liberalization, an entrant and an incumbent play a symmetric investment game.

We find the following results. In the first stage of market liberalization regulatory authorities have to balance between static efficiency and investment, and the optimal access price may be above marginal cost. In the second stage, two different

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outcomes are possible. If the entrant tends to underinvest, regulatory authorities balance between static efficiency and investment. If the entrant tends to overinvest, regulatory authorities set the access price as low as possible in order to prevent or limit infrastructure duplication. Interestingly, we find that in the third stage of market liberalization regulatory authorities may decide to promote infrastructure duplication and to set the access price above the price in the first stage of market liberalization, even if Internet service providers tend to overinvest in infrastructure duplication.

The first two results can be explained as follows. On the one hand, a low access price strengthen competition between Internet service providers, which in turn improves welfare. On the other hand, a low access price reduces the firms' incentives to invest, which either increases or decreases welfare, depending on whether Internet service providers tend to overinvest or to underinvest. The third result is explained by the fact that raising the access price may at the same time induce more duplication and reduce overinvestment, because it increases both the private and the social incentives for infrastructure duplication.

The reminder of the paper is organized as follows. In Section 2, we briefly review the literature and clarify the specificity of our approach.[1] We introduce our model in Section 3. In Sections 4–6, we analyze the optimal access regulation under three different market configurations that approximate the different stages of telecommunications market liberalization. Section 7 concludes.

2. Literature review

The theoretical studies on access regulation and infrastructure investment mainly fall into three categories: the models focusing on incumbents' investment and assuming that entrants cannot build their own infrastructures, those focusing on entrants' decision to access or bypass existing infrastructures and those considering that both incumbents and entrants may build a new infrastructure.

To a large extent, the three market configurations analyzed in the literature can be regarded as representations of the different stages of telecommunications market liberalization. Indeed, when fixed-line telecommunications were first opened to competition (in the late 90s in most OECD countries) it was widely accepted that the infrastructures owned by incumbent firms were essential facilities or at least that entrants did not have the financial resources to build their own infrastructures in the short term. Therefore, the studies focusing on incumbents' investment and assuming that only service-based competition is feasible can be referred to as “the literature on the first stage of liberalization”. In most OECD countries, entrants have progressively rolled out their own backbone networks during the 2000s. The focus of the policy debate has then moved to entrants' investment (see in particular the debate about the “ladder of investment”). The academic research investigating this issue can be referred to as “the literature on the second stage of liberalization”. Presently, in what can be called “the third stage of liberalization”, new telecommunications infrastructures (in particular fiber access networks) could be either built by incumbents or by entrants. Some studies therefore assume symmetric competition between incumbents and entrants. However, some others consider that although both incumbents and entrants may invest, some asymmetries remain between these two types of players.

2.1. First stage of liberalization

The literature on the first stage of liberalization considers that an Internet service provider (the incumbent) may build a new infrastructure or improve an existing one, and that one or several other firms (the entrants) may access this infrastructure. In this framework, conventional wisdom indicates that there is a trade-off between static efficiency and investment: on the one hand lowering the access price reduces the retail prices (higher static efficiency); on the other hand, it lessens the profitability of investment and hence the incentives to invest.

To some extent, this intuition has been confirmed by the early literature on access regulation. Indeed, Foros (2004) and Kotakorpi (2006) show that setting the access price at marginal cost reduces the incumbent's investment in comparison with the (higher) unregulated access price, and Vareda (2010) shows that there is a positive relationship between the access price and the incumbent's investment in quality improvement. However, Vareda (2010) also highlights that a lower access price increases the incumbent's incentives to undertake cost-reduction investments. Furthermore, Foros (2004) and Kotakorpi (2006) underline that access regulation increases the likelihood of foreclosure, i.e. that access regulation may result in a monopoly instead of strengthening competition. More recently, Klumpp and Su (2010) have challenged the concept of a trade-off between static efficiency and investment and have stressed the possibility of improving dynamic efficiency without reducing static efficiency through a “revenue-neutral” access rule.

A new strand of literature has introduced uncertainty and compares different regulation regimes leading to different allocations of risk and different trade-offs between static efficiency and investment (see in particular Bender, 2011; Cambini & Silvestri, 2012; Nitsche & Wiethaus, 2011). Other recent developments of the literature on the first stage of liberalization investigate the case where several firms provide access (Bourreau, Hombert, Pouyet, & Schutz, 2011; Kalmus & Wiethaus, 2010). Finally, Brito, Pereira, and Vareda (2010) analyze how and to what extent two-part tariffs can solve the “dynamic

[1] We focus on the theoretical literature on access regulation and infrastructure investment. See Cambini and Jiang (2009, pp. 568–571) for a review of the empirical studies.

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