Access regulation under asymmetric information about the entrant's efficiency

João Vareda *

Autoridade da Concorrência, Avenida de Berna no. 19, 1050-037 Lisboa, Portugal
CEFAGE-UE, Largo dos Colegiais no. 2, 7000-803 Évora, Portugal

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ABSTRACT

We study the impact of access regulation on an entrant's decision whether to invest in a telecommunications network or to ask for access when the regulator cannot observe its efficiency level. We show that an efficient entrant may have incentives to target low demand after entry in order to convince the regulator that it needs cheap access in the future. Therefore, the regulator must set access prices, contingent on demand, which penalize the inefficient entrant. We further show that, although linear prices are not always sufficient to promote the investment of an efficient entrant without introducing distortions, two-part tariffs already allow the regulator to achieve this objective.

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1. Introduction

Telecommunications markets are generally characterized by the presence of an operator – the previously state-owned firm – that enjoys significant market power due to high entry barriers. These barriers result mainly from the large financial and time-consuming investments that the building of a new network requires, investments which in turn make it difficult for a new operator to enter the market as a full facility-based competitor, at least in the short-run.

To solve this problem, regulatory authorities often require the incumbent to make parts of its network available to operators that want to enter the market but have no capacity to build a complete network. These operators can enter as service-based competitors by using the incumbent's network to supply their services, paying an access price in return. However, and as De Bijl and Peitz (2002) argue, the long-run objective of a regulator is to have facility-based competition since this creates a level playing field between the incumbent and entrants and increases the incentives for product innovation.

The objectives of creating competition in the short-run and having facility-based competition in the long-run were traditionally seen as contradictory. Only recently, the European Commission started claiming that there is no trade-off between these two types of competition, based on the "*Investment Ladder Theory*" (see Cave and Vogelsang, 2003). According to this theory, service-based competition can lead to facility-based competition if it is managed correctly. Initially, regulators should encourage entry into markets where there is significant market power by setting low access prices. Then, over time, once entrants have

* Address: Autoridade da Concorrência, Avenida de Berna no. 19, 1050-037 Lisboa, Portugal.
 E-mail address: joao.vareda@concorrencia.pt.

consolidated their positions in the market and investment costs are lower, regulators should start to increase access prices. Entrants are expected to respond to these increases by investing in their own networks.

Yet, the "*Investment Ladder Theory*" is difficult to implement due to the asymmetry of information which characterizes telecommunications markets. According to De Bijl and Peitz (2002), "*given the uncertain nature of technological progress in telecommunications and the rapid change of market structure, it is impossible to precisely forecast the success of entrants*". That is one of the reasons why Oldale et al. (2004) argue that operators generally have superior information about their efficiency, translated into their ability to offer high quality services or to capture a high demand level, while regulators can only infer the entrants' efficiency level by the observation of their performance after entry. Hence, when regulators observe that entrants are still dependent on cheap access to compete in the market, because demand is still low, they continue to set low access prices. However, if entrants are already doing well, with a large costumer base, regulators ban access in order to induce them to invest. This policy gives the wrong incentives to efficient entrants since it penalizes entrants that do well, while protecting the ones that do badly. In fact, efficient entrants may have incentives to shirk, i.e. to target a lower demand level, in order to induce regulators to continue to set low access prices in the future.

In the following, we argue that this asymmetry of information introduces distortions even when regulators take their decisions before retail competition and are able to commit to them, since the resulting optimal outcome are access prices which depend on demand observations.

In order to analyze the impact of access regulation on the entrant strategies, we construct a dynamic framework with two periods of telecommunications competition, two operators (an incumbent and an entrant), and asymmetric information about the entrant's efficiency level.

Similar to Bourreau and Dogan (2005), the entrant can compete in the market as a service-based competitor by asking for access to the incumbent's network, or compete as a facility-based competitor by building its own network. The entrant can be one of two types, efficient or inefficient (what we call a high- or a low-type entrant, respectively). For a low-type entrant, the investment in its own network is too expensive; therefore it will always need access to the incumbent's network to be able to compete. On the other hand, a high-type entrant, after asking for access in the first period, may opt to invest in a new infrastructure in the second period. In the case of a high-type entrant, the first-best regulatory policy is to promote investment in the second period. In the case of a low-type entrant, the first-best policy is to promote service-based competition in both periods.

However, the regulator is not able to set the first-best regulatory policy since the efficiency level of an entrant depends on factors that he cannot observe, namely those related to its production function and financial restrictions. Therefore the regulator can only form prior beliefs about whether the entrant is an efficient or an inefficient one. Nevertheless, the regulator is able to observe the demand captured by the entrant at the end of the first period, which constitutes a signal about its efficiency level.

In a scenario of asymmetric information, we show that welfare is higher if the regulator sets second-period access prices contingent on first-period demand observation, which in turn induce the high-type entrant to reveal its efficiency level. With linear tariffs, this regulatory action introduces distortions in the access prices in favour of the high-type entrant. When the high-type entrant's profit decreases faster in the access price for a high demand level, the first-period access price set by the regulator is lower than the one he would set if the entrant was not able to shirk. Additionally, and in order to make the gains from shirking lower, the regulator sets a higher second-period access price contingent on low demand. In an extreme case the access price may be such that a low-type entrant exits the market. The second-period access price contingent on high demand may or may not force a high-type entrant to invest.

We further analyze whether non-linear tariffs, specifically two-part tariffs, are sufficient to induce the socially optimal outcome. We show that by setting a sufficiently high access fee for the second period the regulator is able to induce a high-type entrant to invest, without the need to introduce any distortions on the usage charge. This result confirms that when markets are characterized by dynamic features, non-linear tariffs must be considered by regulators.

These results are not surprising on a theoretical (mechanism design) level, but the application to access pricing under uncertainty about the efficiency level is novel. Indeed, there are few applications of this type of signaling game to a telecommunications regulation context. Sarmento (2003), for instance, considers a model where the incumbent uses its price as a signal about the demand size of potential entrants in order to induce the regulator to allow only a small number of entrants. Contrary to her paper, in our model the receiver of the signal, the regulator, is the first to move by setting the access prices. Thus, he can use the Revelation Principle, due to Myerson (1979), to construct a direct-revelation mechanism with a truth-telling equilibrium. This is similar to the performance-based regulation mechanism in Laffont and Tirole (2000).[1] The main difference from our paper is that these authors assume that the incumbent's cost can be affected by an unobserved cost-reducing effort, while in our paper the asymmetry of information involves the entrant's efficiency. Besides, in Laffont and Tirole (2000), the regulator sets a transfer payment from consumers to the regulated firm, instead of an access price. This process, however, does not represent the current European and US practice. Also, in a context of asymmetric information, Caillaud and Tirole (2004) analyze the funding of an infrastructure by an incumbent firm, when it has private information about the profitability of this investment.[2]

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[1] The application of a performance-based regulation mechanism is translated into the design of a menu of contracts in which firms self-select: more efficient firms bear a higher fraction of their cost, which they know to be low. Similar to our paper, this mechanism results in higher rents for the efficient types. See also Laffont and Tirole (1993).

[2] Caillaud and Tirole (2004) show that the regulator should not screen the incumbent by letting it choose between a contribution by the entrant for open access and the option of foregoing any outside contribution in exchange of an exclusive right since the incumbent would choose to obtain exclusivity when the benefits of competition were higher.