



Regulating termination charges in asymmetric oligopolies [☆]



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ABSTRACT

This paper extends a standard Hotelling model to three firms and analyzes the competitive effect of asymmetric regulation on mobile and fixed termination charges. In the presence of fixed-mobile substitution, above-cost mobile termination charge creates a trade-off on the mobile network's profit: i.e., (i) reducing retail profit by strengthening competition for subscribers ("price competition effect"), and (ii) raising termination profit by increasing market shares ("market share effect"). Our analysis shows that the competitive effect of asymmetric regulation on mobile and fixed termination charges is decided by the interaction between these two effects, which in turn depends on the distribution of customer types. That is, above-cost termination charges are likely to be beneficial to consumers for a sufficiently large fixed-mobile type (i.e., customers choosing between mobile and fixed networks) compared to a mobile type (i.e., customers choosing between mobile networks), while they are likely to be harmful to consumers for a small fixed-mobile type. It would be an important implication for regulatory authorities that there exist various factors to consider in regulating termination charges, including the industry development and market structure.

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1. Introduction

In the telecommunication industry, when a caller places a phone call, the receiver's network imposes a fee on the caller's network for call termination services, known as "termination charges". There is no general consensus among regulators on the optimal level of termination charge that will maximize the social welfare. For instance, Ofcom, the regulator in the UK, argues that termination charges should be slightly above the cost of termination

(Ofcom, 2007), while the European Commission recommends that regulators set termination charges at termination cost (European Commission, 2009).

Meanwhile, European Commission (2009) stresses the potential competitive distortions from the asymmetric treatment on termination charges and recommends that regulatory agencies adopt symmetric and cost-based termination charge regulations. The recommendation mainly focuses on the competitive effect of termination charges on either mobile markets or fixed markets in isolation, while in the real world, termination rates can have important strategic and competitive implications for the interaction between these two markets.

"Termination markets represent a situation of two-way access where both interconnecting operators are presumed to benefit from the arrangement but, as these operators are also in competition with each other for subscribers, termination rates can have important strategic and competitive implications. Where

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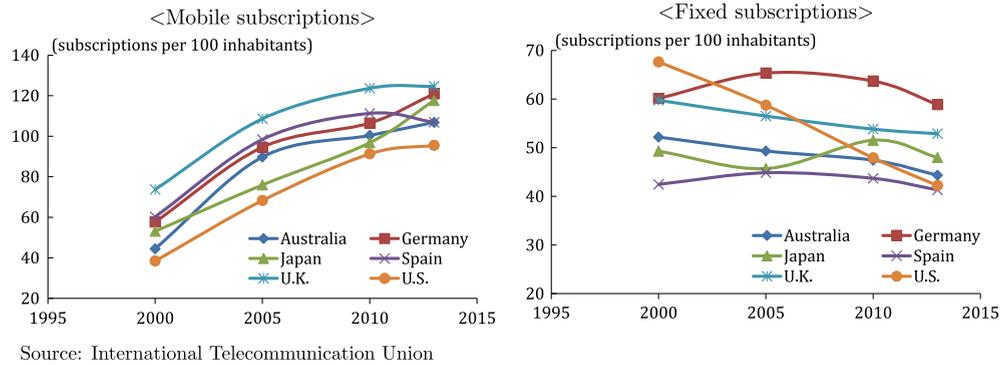


Fig. 1. Mobile and fixed subscriptions in selected developed countries.

termination rates are set above efficient costs, this creates substantial transfers between fixed and mobile markets and consumers.” (European Commission, 2009, p. 67).

We also find that, in many developed countries, the recent dramatic increase in subscriptions to mobile networks coincides with a significant decline in subscriptions to fixed networks. Fig. 1 demonstrates that, in the 2000s, mobile subscriptions increased dramatically while fixed subscriptions decreased significantly.¹

To capture these regulatory practices and industry developments, this paper introduces competition for subscribers between mobile and fixed networks as well as between mobile networks by extending a standard Hotelling model to three firms: two symmetric mobile networks and one fixed network.² Departing from Armstrong and Wright’s (2009) duopoly model with hinterlands, our model introduces competition for subscribers between mobile and fixed networks in an explicit way. This paper analyzes how the asymmetric regulation on mobile and fixed termination charges affects the network’s profit and the consumer surplus in the presence of asymmetry between mobile and fixed networks: (i) in the market size (Section 4), and (ii) in the termination cost and fixed utility (Section 5).³

Unlike most existing literature in which mobile and fixed subscribers have been treated as disjointed groups, the novel feature of this paper is to introduce the existence of fixed-mobile substitution in subscription, which results in the endogenous determination of market share. Thus, mobile networks can expand their market shares by penetrating into the fixed market, since the total market size is fixed from the assumption of inelastic demand.

This paper demonstrates that the competitive effect of above-cost termination charges mainly depend on the

distribution of customer types: i.e., above-cost termination charges are likely to be beneficial to consumers for a sufficiently large fixed-mobile type (i.e., customers choosing between mobile and fixed networks) compared to mobile type (i.e., customers choosing between mobile networks), while they are likely to be harmful to consumers for a small fixed-mobile type. In other words, above-cost termination charge raises the consumer surplus if it causes a large increase in market share that offsets an increase in call prices, while it reduces the consumer surplus otherwise.⁴

The distribution of customer types can be interpreted in terms of the development stage of the telecommunication industry (i.e., mobile-oriented or fixed-oriented). The finding suggests that the asymmetric regulation on mobile and fixed termination charges is likely to be beneficial (harmful) to consumers if the telecommunication industry is fixed-oriented (mobile-oriented). It would be an important implication for regulatory authorities that there exist various factors to consider in regulating termination charges, including the industry development and market structure.

This paper contributes to the literature in several respects. First, we present a tractable model representing more realistic competition in the telecommunication industry by extending the circular city model of Salop (1979). Our model incorporates competition among multiple networks in the presence of asymmetry between mobile and fixed networks in both the customer type and the regulation on termination charges. The model is also extended to introduce asymmetry in termination cost as well as in fixed utility between mobile and fixed networks.

Second, this paper analyzes the competitive effect of asymmetric termination charge regulation between mobile and fixed markets by departing from the literature which focuses on the competitive effects of asymmetric termination charge regulation in the same market (either mobile markets or fixed markets) between incumbents and entrants (e.g., Peitz, 2005a,b).

Lastly, our analysis identifies the important factors in determining the welfare effect of regulation on termination charges. To be specific, the analysis suggests that the symmetric and cost-based regulation on mobile and fixed

¹ Similar patterns of FTM substitution can be found in other developed countries. Further information is available at <http://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx>.

² In many developed countries, the oligopoly is a typical competition structure in the telecommunication industry. For instance, in the EU countries (e.g., France, Spain, Sweden and the UK), there exist multiple mobile networks and a fixed network having significant market shares. See Armstrong and Wright (2009) for more details.

³ It is commonly observed that termination charges of fixed networks have been more tightly regulated than those of mobile networks in many countries (Hoernig et al., 2015).

⁴ The outcome is in stark contrast to the welfare effect of above-cost termination charges in Armstrong and Wright (2009), in which competition for subscribers between mobile and fixed networks is not considered and thus the optimal termination rates are always above cost.

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