



Fixed-mobile substitution and termination rates



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ABSTRACT

This paper studies the effect of termination rates on the observed substitution between fixed and mobile calls and access, in a model where consumers can subscribe to one or both types of offers. Simulations show that each (fixed or mobile) termination rate has a positive effect on the take-up of the corresponding service, via the waterbed effect, and lowers subscriptions to the other service, via a cost effect. The prevailing asymmetric regulation, with very low fixed and higher mobile termination rates, tends to have implemented the optimal fee structure. However, the interests of the mobile operators and of the different customer groups did not coincide, and this fee structure may have reduced overall market participation.

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1. Introduction

The issues at hand: New technologies and innovative service providers often challenge the provision of traditional services. One of the most striking examples is the advent of mobile telephony, and its impact on fixed telephony services. Only three decades ago, fixed-line operators seemed to fulfil all communications needs over their networks, but in the last 20 years mobile telephony has significantly altered the historical market structure. All over the world, wireless services have recorded substantial growth in terms of subscribership, revenues, and usage, and despite the recent economic crisis, the number of mobile subscribers has continued to grow.

Much of the success of the mobile sector is due to fixed-mobile substitution. Major technological advances and cost reductions have enabled mobile carriers to decrease the difference between fixed and mobile bills, allowing them to become strong competitors to traditional fixed providers. At the same time, the fixed and mobile markets have been subject to regulatory intervention, but to different degrees: while fixed telephony operators' retail and wholesale prices (i.e., the "fixed termination rates" charged to other operators for receiving their calls) tended to be strongly regulated at cost, for mobile operators only termination rates were eventually regulated, and until recently at values far above marginal cost.

Empirical studies have attempted to quantify fixed-mobile substitution (see, for example, the survey by Vogelsang, 2010, as well as the following section), but there is a lack of theoretical research on this matter. The present paper tries to start filling this gap. Clearly, there is a variety of factors that could be considered as potential causes of fixed-mobile substitution, and none on its own might provide a sufficient explanation. Certainly, demand-side factors, such as changing habits and acceptance of new technologies, influence consumer preferences and their subscription decisions to connect to the fixed and/or the mobile networks. Supply side factors, such as the introduction of pre-paid tariffs which attract consumers with a

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lower willingness to pay, were important, too.¹ This paper focuses on the institutional framework as a contributing factor, in particular the role of asymmetric regulation of termination rates on fixed and mobile networks.

The paper presents a model with three independent but interconnected operators, one fixed and two mobile networks. The key novelty is the construction of the demand side. All subscribers spend the same fraction of their time outside home, but depending on their personal preference for mobile telephony, they choose whether to subscribe to a fixed or a mobile network, or to both. Differently from the previous literature, this paper considers the only realistic case, where mobile-only, fixed-only and “fixed-mobile” customers are all simultaneously present in market equilibrium. This framework is in line with the past and the recent evidence from the market. The association of European Telecom Regulators (BEREC, 2011) reported that although the share of mobile-only households increased and that of fixed-only households decreased over time, having both is now the most common situation in Europe (62% of households, on average) and that this share is not declining over time.² The policy goal of this paper is therefore to evaluate the regulatory design of mobile-to-mobile and fixed-to-mobile termination rates as it has been implemented in the last 20 years. While in the near future the technological change towards all-IP networks will clearly modify the termination scenario here considered (with termination charges converging to zero), the analysis of the role of termination on historical fixed-to-mobile substitution deserves a better understanding.

The model set out below shows that the possibility of call and access substitution can affect call pricing if subscribers are heterogeneous. More specifically, when mobile termination rates are relatively high, mobile-to-fixed prices are distorted downwards from marginal cost, while when mobile termination rates are relatively low (almost at cost) both mobile-to-mobile and mobile-to-fixed calls are downward distorted. Since mobile-only customers both make and receive more calls on their mobile phones than those that hold both a fixed and a mobile subscription, while both types of consumers are equally affected by the level of fixed fees, a usage-discriminating “waterbed effect” arises that transmits termination profits via discounts in call prices. Thus networks distort prices to take advantage of consumers’ differing usage patterns.

The main aim of this paper, though, is to analyze the impact of varying levels of termination rates on consumers’ subscription decisions. The key question is whether the different regulatory treatment of termination on fixed and mobile networks affected the development of fixed and mobile subscription decisions. Numerical simulations based on the model show that each (fixed or mobile) termination rate has a positive effect on the take-up of the corresponding service, via the waterbed effect, and lowers subscriptions to the other service, via a cost effect. Moreover, because of the same effect higher termination rates increase the number of consumers who do not subscribe to any service.

Summing up, the model indicates that the policy of high mobile and low fixed termination rates – which has been prevalent until the recent past – led to an additional shift of subscriptions from fixed to mobile networks. Furthermore, since mobility appears to generate social benefits, this structure of termination rates tends to have led to higher social welfare than other structures of termination rates. But since it negatively affected fixed line coverage and total subscription demand, there may have been more efficient instruments to increase mobile coverage.

Literature review: There exists a sizeable economic literature on the relationship between fixed and mobile telephony, and on the role of fixed-to-mobile termination rates.

Wright (2002) considers fixed-to-mobile calls with a focus on mobile termination rates, while others (e.g., Valletti & Houppis, 2005) analyze how socially optimal mobile termination rates depend on the magnitude of network externalities, the intensity of competition in the mobile sector, and the distribution of customer preferences. These papers however do not consider the role of fixed-mobile substitution (both at access and service levels), and more importantly, they do not take into account consumer heterogeneity with respect to the benefits from mobility, as done in this paper.

Armstrong and Wright (2009) and Hausman (2012) analyze the role of call substitution and discuss voluntary vs. regulated setting of termination rates. These authors show that direct substitution between fixed- and mobile-originated calls weakens the competitive bottleneck of call termination, and brings the termination rates that firms would choose closer to the efficient level while remaining above cost. Hence, the welfare gains from regulating mobile termination rates are smaller, while private incentives do not imply excessively high levels. Our paper departs from these studies by analyzing the more realistic situation where substitution affects not only the types of calls made but also consumers’ access decisions. Moreover, the our model highlights how subscription decisions and welfare are affected by both mobile and fixed termination rates.

While Armstrong and Wright (2009) also show, in the absence of fixed-mobile substitution, that higher mobile termination rates increase the coverage of the mobile network, their model does not allow to determine their effect on the fixed network (nor the simultaneous effect on either type of network of the level of fixed termination rates). In particular, Armstrong and Wright state that “an alternative kind of substitution between fixed and mobile networks may take place at the subscription level rather than the per-call level, so that some people might give up their fixed line altogether and become mobile-only users.” (footnote 34, p. 296). This paper confirms Armstrong and Wright’s conjecture, by joining both fixed-mobile substitution and elastic subscription demands on both types of networks.

Baake and Mitusch (2009) find that mobile networks have a joint incentive to set mobile termination rates above cost in order to increase the number of mobile users; however, they do not analyze the simultaneous effect of fixed termination,

¹ We would like to thank a referee for pointing this out.

² Based on the 2011 E-communications household survey, the number of households having at least one mobile subscription is rather high and homogeneous – from 82% to 96% (with an average of 89%) – across Europe. On the other hand, fixed-line penetration is extremely heterogeneous: it is very high in countries such as Sweden (98%), the Netherlands (89%) and France (87%), whereas only 17% of Czech households are connected. Mobile-only households range from 2% to 81%, while the share of fixed-mobile users range from 15% to 94%.

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