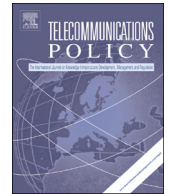


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# Telecommunications Policy

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## What is the magnitude of fixed–mobile call substitution? Empirical evidence from 16 European countries



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### ABSTRACT

This paper investigates the degree of fixed–mobile call substitution (FMCS) within different European countries. We use quarterly data from 2004 to mid-2010 on 16 mainly Western European countries. By applying dynamic panel data techniques, we are able to estimate short- and long-run elasticities of the telecommunication usage prices on the fixed-line call demand. The own-price and cross-price elasticities found give strong empirical evidence for substitutional effects towards mobile services. In particular, the estimated cross-price elasticities of the mobile price on the fixed-line call demand are relatively large compared to other studies.

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### 1. Introduction

After the implementation of GSM digital technology at the beginning of the 1990s, mobile devices became mass products, prices dropped and penetration rates dramatically increased (Gruber, 2005; Hausman, 2002). As well as the fact that the number of mobile subscribers has been larger than the number of fixed-line subscriptions since the early 2000s, we observe that fixed and mobile voice traffic volumes are converging. Whereas mobile call volumes are rising, fixed-line voice traffic volumes have continuously declined over the past decade. Fig. 1 exemplifies the development of the average monthly fixed and mobile voice traffic per subscriber for four different European countries from 2005 to 2010. We chose the UK because it has always been a leader in market liberalization and is one of the major economies in the European Union (EU). Furthermore, Germany is included as the largest economy in the EU. Austria and Finland are good examples of smaller member countries where especially in Finland as well as in other Nordic countries mobile telecommunications have been important much earlier than in other European countries. These countries provide a thorough overview of the convergence of fixed and mobile voice traffic in the EU. Obviously, the progress of convergence varies between these countries. For instance, in Austria and Finland mobile voice traffic has already exceeded the fixed-line traffic several years ago, and continues to do so. In other countries, such as Germany and the UK, however, fixed-line phones are still used more often to place calls than mobile devices.

Fixed and mobile telecommunications markets are monitored by national regulatory authorities (Laffont & Tirole, 2000), but the degree of regulation is quite different. On the one hand, fixed markets are regulated quite heavily. On the other hand, mobile markets are regulated less restrictively, as they were more competitive from their inception (Haucap, 2003). However, recent observations lead to the question whether asymmetric regulation of fixed and mobile markets is still appropriate. If convergence of fixed and mobile traffic markets leads to substitution of both services, asymmetric regulation of the two markets is no longer suitable. Competitive pressure from one market due to the substitutability of services might restrict

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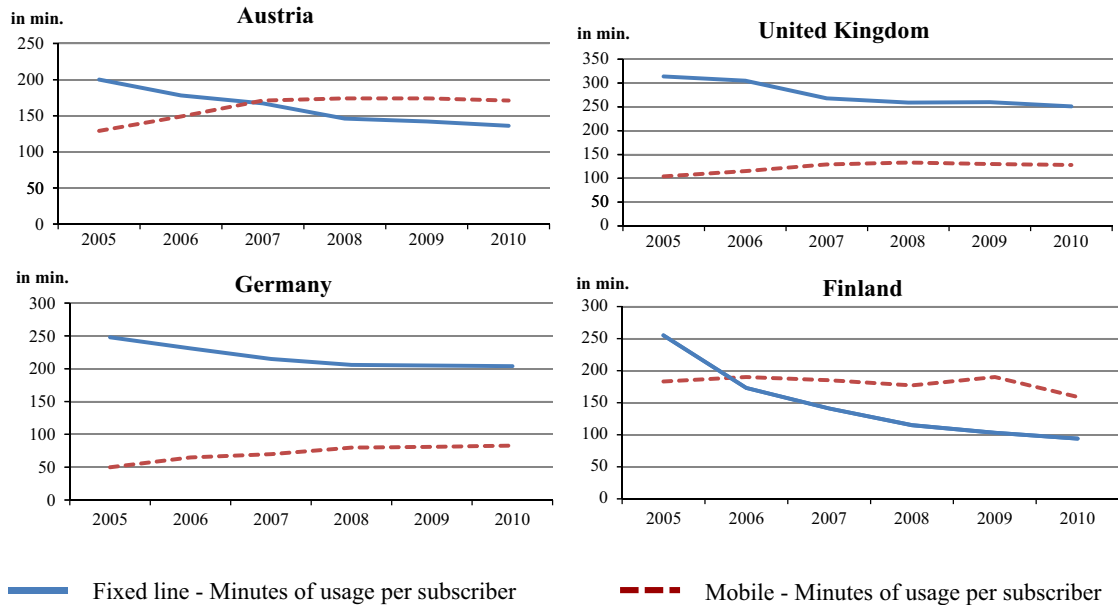


Fig. 1.

market power in the other market so that an isolated view of single markets is no longer appropriate from a regulatory as well as an antitrust point of view. We expect convergence and, as a result, substitution between fixed and mobile services becoming stronger over time and hypothesize that one might arrive at a joint market applying standard market delineation techniques in the near future. If this hypothesis holds, a new market definition for regulation has to be found.

The number of econometric studies analyzing the substitutional relationship between fixed and mobile networks is limited and their results are quite ambiguous. Most of the studies use data up to 2003. In contrast, studies using more recent data, including [Briglaue, Schwarz, and Zulehner \(2011\)](#), [Grzybowski \(2011\)](#) and [Barth and Heimeshoff \(2014\)](#), unanimously conclude that the two services are substitutes, at least in developed countries.<sup>1</sup> These findings substantiate that fixed–mobile substitution already prevails. However, these studies differ on whether they just find significant cross price effects or apply formal market delineation techniques to define antitrust markets as for instance [Briglaue et al. \(2011\)](#) do.

Consequently, the research focus has shifted from the question of whether the two technologies are substitutes or not, to the question of to what extent fixed and mobile services are substitutable, and if the magnitude found is strong enough to justify regulatory adjustments. Few studies exist that focus specifically on the usage of mobile phones instead of access, and all find different degrees of substitutability. Additionally, there is, to the best of our knowledge, no econometric paper analyzing fixed-to-mobile call substitution in a multiple-country setting. Therefore, based on the panel structure of our dataset the present paper controls for unobserved heterogeneity and avoids possible biases in estimated elasticities due to missing variables. As a result, our analysis sheds some new light on the relationship between fixed and mobile telecommunications services.

We address fixed–mobile call substitution within 16 mainly Western European countries. Using quarterly data from 2004 to mid-2010, the paper analyzes to what extent fixed and mobile phone calls are substitutes. Our paper is structured as follows: Section 2 provides an overview of the empirical literature related to fixed–mobile substitution; in Section 3, the dataset and its descriptive statistics will be explained; Section 4 introduces our model specification and describes our estimation approach; and Section 5 explains our main results. Finally, Section 6 concludes.

## 2. Literature review

Fixed–mobile substitution (FMS) can be analyzed on different levels: especially access and usage ([ITU, 2010](#)). Hence, empirical research on penetration models, as well as studies estimating access or calling demand, is relevant for the analysis of FMS ([Vogelsang, 2010](#)). To analyze the substitutability between products, usually own- and cross-price elasticities are estimated ([Taylor, 1994](#)). The following two subsections separately discuss the existing literature on the access and usage level.<sup>2</sup>

<sup>1</sup> Note that [Barth and Heimeshoff \(2014\)](#) focus on access substitution.

<sup>2</sup> The literature review is based on the corresponding section in our previous paper ([Barth & Heimeshoff, 2014](#)).

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