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# Market definition for broadband internet in Slovakia – Are fixed and mobile technologies in the same market? ☆

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## ABSTRACT

This paper uses a rich survey of 6446 households in Slovakia to estimate price elasticities of demand for Internet access, and draw implications for market definition. We estimate a mixed logit model, in which households choose between different broadband technologies: DSL, cable modem, fibre, WiFi and mobile. We find that a number of household characteristics influence the technology choices, and there is also significant unobserved heterogeneity. Demand for Internet access is highly price sensitive. The price elasticity of demand for DSL is  $-3.02$ , which falls in the middle of the range of elasticities for the other technologies. Furthermore, the price elasticity of demand at the level of all fixed broadband technologies (DSL + cable modem + fibre + WiFi) is equal to  $-1.98$ . For a reasonable range of profit margins, this estimate implies that mobile broadband should be included in the relevant antitrust market of fixed broadband. Our findings have implications for competition policy in Central and Eastern European countries where due to poor copper networks mobile broadband is an important alternative to fixed broadband.

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## 1. Introduction

The extent of substitution between fixed-line and mobile telecommunications services has been debated since the early days of mobile telecommunications. This debate bears substantial relevance for market definition and, consequently, for the regulatory and antitrust proceedings.<sup>1</sup>

The historical development of copper based fixed-line infrastructure has differed substantially, in terms of availability and quality, between the Western European (WE) and the post-socialist Central and Eastern European (CEE) countries. In the CEE countries, the telecommunications infrastructure inherited from the socialism era was in a poor condition before the liberalization of the

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<sup>1</sup> The first step in merger proceedings and abuse of dominance cases is market definition; that is to identify in a systematic way the competitive constraints that the undertakings face. In many regulatory proceedings the outcome of a market definition may determine whether a firm has significant market power (SMP) in the relevant product market and, hence, whether the National Regulatory Authorities (NRAs) may impose ex ante regulation. In the old telecommunications regulatory framework, a firm was presumed to have an SMP if the share was above 25% of the relevant product market. In the new regulatory framework, the threshold is more closely aligned with the competition law concept of dominance, i.e., market shares above 40–50% would lead to a presumption of SMP.

telecommunications markets in the early 2000s, which was the prerequisite for the EU accession). We therefore observe greater shares of households relying on mobile voice services in the CEE countries than in the WE countries.<sup>2</sup> For the same reason, the development of broadband infrastructure follows a different path. Alternative infrastructures, including mobile broadband access, have a higher share in the CEE countries than in the WE countries, which heavily rely on DSL broadband access.

To date regulators in Europe hesitate to include mobile broadband in relevant broadband antitrust markets (with the notable exception of the Austrian telecommunications regulator RTR), which appears to be driven by a focus the technical and functional differences between fixed and mobile services.<sup>3</sup> However, given the importance of mobile broadband in the CEE countries we propose a more careful consideration of revealed consumer preferences.

This paper contributes to the discussion on market definition for broadband by providing an econometric analysis of consumer choices of broadband services in Slovakia. We address the question of market definition and substitution between fixed and mobile technologies by estimating price elasticities based on discrete choice models, which take into account the actual choices of consumers. More specifically, we estimate price elasticities based on data from a representative survey of 10,000 households conducted by the Gesellschaft fuer Konsumforschung (GfK) in Slovakia (after data cleaning we retain 6446). Our evidence suggests to extending the market for fixed broadband access towards mobile broadband access. This conclusion may also be relevant for other CEE countries such as Czech Republic and Poland, which feature similar market structures to Slovakia.

Discrete choice models are increasingly used to estimate price elasticities. In the discrete choice set-up, households choose between different broadband technologies, which in our case are: DSL, cable modem, fibre, WiFi and mobile. We estimate a mixed logit model, which controls for observable heterogeneity between households through household characteristics such as household size and income, and in addition allows for unobserved differences through random coefficients. We find that a number of household characteristics influence the technology choices and price sensitivity, and there is also significant unobserved heterogeneity. These findings enable us to account for flexible asymmetric substitution patterns across technologies; that is, cross-price elasticities may differ across different technologies.<sup>4</sup>

Based on the mixed logit model, we find that the demand for Internet access in Slovakia is very price sensitive, with own-price elasticities at the level of individual technologies ranging from  $-4.94$  for WiFi, to  $-3.06$  for cable modem,  $-3.02$  for DSL,  $-2.75$  for fibre and  $-1.42$  for mobile. These elasticities suggest that none of the fixed technologies can be considered as a separate relevant retail market for reasonable margin assumptions. In particular, a 5–10% DSL price increase would lead to substantial substitution to other technologies, making such a price increase unprofitable.

We then repeat the same exercise for hypothetical price increases for various groups of fixed broadband technologies. The results show that no combination of fixed broadband technologies can be considered to be a relevant retail market. In particular, this is the case if we include all fixed broadband technologies together. We find that the price elasticity of demand for all fixed broadband is equal to  $-1.98$ ; i.e., a price increase in all fixed broadband technologies by 1% would reduce fixed broadband demand by 1.98%. This elasticity suggests substantial substitution towards mobile broadband and, hence, a relevant antitrust market including mobile broadband, for reasonable margin assumptions.<sup>5</sup>

The elasticities reported above are country-level price elasticities, which measure the effect of a national price increase on total demand (where consumers can only substitute to locally available alternatives). They are most relevant when companies can follow national pricing strategies. We also consider elasticities at the municipality level. These measure the effect of local price increases. In the paper we report the local elasticities for 50 municipalities for which there are sufficient respondents.<sup>6</sup> For the remaining ones, we provide aggregate statistics. The elasticities at the municipality level confirm the results obtained at the national level. The local elasticities are also high, so that in nearly all municipalities the relevant retail market for DSL includes not only all fixed broadband technologies, but also the mobile technology. The results are robust with respect to various sensitivity tests of the model, which we report in the paper.

The remainder of the article is organized as follows. Section 2 discusses the relevant literature. Section 3 presents the industry background. Section 4 introduces the econometric framework. Section 5 discusses the data used in the estimation. Section 6 presents the estimation results. Finally, Section 7 concludes.

## 2. Literature review

Competition between different technologies for Internet access has increased significantly over the past decade. The degree of substitutability of different technologies is relevant for antitrust and regulatory cases and has

<sup>2</sup> Source: "Special Eurobarometer 362, E-communications Household Survey", 2011.

<sup>3</sup> Mobile and fixed broadband may differ according to the characteristics of mobile and fixed offers (e.g. differences in price, bandwidth, mobility and usage limitations). Some regulators also point to differences in usage patterns (e.g. some NRAs considered that fixed broadband consumers use the service more intensively and demand higher bandwidth than mobile broadband consumers). Source: "BEREC Report on Impact of Fixed-Mobile Substitution in Market Definition", December 2011.

<sup>4</sup> The report by the Body of European Regulators for Electronic Communications (BEREC, 2011) discusses market definition and asymmetric substitution between fixed and mobile telecommunications services mainly due to the mobility feature of the mobile services.

<sup>5</sup> Substitution in the other direction, from mobile to fixed technologies is lower. Thus, from the perspective of mobile broadband, fixed broadband technologies must not be included in the relevant antitrust market.

<sup>6</sup> There are 79 counties in Slovakia which are divided into 2930 municipalities. The 50 most populous municipalities represent about 36% of total population of Slovakia.

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