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The effects of the Internet and mobile services on urban household expenditures: The case of South Korea

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ABSTRACT

This paper investigates the changes in the structure of the household expenditure on telecommunications services and its relationships with other existing expenditures in South Korea employing the average household monthly expenditure from 1998.Q1 to 2014.4Q. The linear approximate Almost Ideal Demand System (LA/AIDS) is implemented in both short-run and long-run models. The short-run relationship is estimated using a seemingly unrelated regression (SUR) with first differenced series of data, and the long-run relationship is examined through a Vector Error Correction Model (VECM). Both sets of empirical results suggest that the household demand for telecommunications services is income inelastic over the whole analysis period, and the absolute value of the own price elasticity noticeably increased in the period of 2007.Q1–2014.Q4. Additionally, the estimations from the VECM LA/AIDS model suggest that the relationship between telecommunications services and other existing goods/services such as public transportations, cultural services, books and private education had a complementary relationship in the early period of the Internet and mobile services. However, a substitution relationship has tended to be reinforced after the Internet and mobile services came into widespread use.

1. Introduction

For the past 20 years, the Internet and mobile services experienced remarkable advances in South Korea, and this growth has significantly affected the structure of the household expenditures. The share of the household budget assigned to telecommunications services has been steeply increasing in South Korea. According to OECD communications outlook 2013, the share of the household expenditures on telecommunications in South Korea was 6%, which was the highest share among all OECD member countries.

Although this reflects the development and high penetration of the Internet and mobile services in South Korea, there has arisen one concern over this issue. The Korean government has been concerned that the expenditure on telecommunications services is becoming a burden to the low-income households. The government has regulated the prices of telecommunications and induced operators to lower rates further. Despite the steady decreases in prices, however, the household expenditures on telecommunications services are much greater than the average in OECD member countries, and the effects of government policy is still controversial.

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Another effect of the advances in the Internet and mobile services is the changes in household expenditures on other existing goods and services. As Lee and Lee (2012) point out, it is worth noting that recent telecommunications services are evolving from simple voice and Internet services into a multifunctional tool to provide diverse services such as the acquisition of information, online transactions, and entertainment goods such as music, games and video. The Internet has enabled new forms of social interaction and activities. In light of these trends, we can infer that telecommunications services would affect the household expenditures on existing goods/services such as transportations, cultural services and education. However, the directions of those effects are ambiguous. Taking, for instance, expenditure on private education, households can spend more time and budget on private education services with the growth of online education markets. On the other hand, plenty of information and learning materials provided by the Internet might substitute for the expensive offline education services, and households might reduce their average spending on private education services.

The purpose of this study is to investigate the structure of the household expenditure on telecommunication services and their relationship with other existing expenditures after the introduction and diffusion of broadband and mobile services in South Korea. In particular, this study examines how the demand for telecommunications services has changed since the use of the Internet and mobile services became widespread. For comparison between the early and the late period of the Internet and mobile services, the whole analytic periods are divided into two stages and analyzed separately for each stage.

The analysis of changes in demand for telecommunications services could have implications regarding the above two issues. Firstly, we can answer the question of whether or not telecommunications demand is sensitive to prices and income variations, and whether or not governmental intervention on prices is still effective in easing the burden on low-income households. Secondly, with respect to the cross price elasticity of demand, the interrelationship between telecommunications services and other goods/services will be evaluated, so that we can infer the correlation between the development of telecommunications services and consumption of other existing goods and services.

This study is organized as follows. Section 2 reviews the related literature and Section 3 describes the analysis model and data used. Sections 4 and 5 develop the static and dynamic approaches and display the estimation results. Section 6 concludes with the main findings and their policy implications.

2. Literature review

With remarkable advances in the Internet and mobile voice services, there have been many empirical studies that address the relationship between telecommunications services and consumption of other existing good/services. Hong (2007) analyzes whether the growth of the Internet complements or substitutes for consumption of existing entertainment goods by applying a difference-in-differences approach. Zentner (2006) attempts to measure the effect of the Internet on the music industry, especially concentrating on measuring the impact of online file sharing on music sales in stores. These studies regarding the effect of growth in telecommunications services are conducted on micro-level data. While the analysis with microlevel data is often limited in the scope because of data restrictions, it is invaluable for describing behavioral changes.

An aggregate approach with time series data, by contrast, has the merit of providing insight into structural changes over a long time period. With aggregate data, aggregate demand modeling can be used to investigate substitution and complementarity between telecommunications and other existing commodities. The Almost Ideal Demand System (AIDS) developed by Deaton and Muellbauer (1980) has received considerable attention as a popular model for estimating demand functions using aggregate data, and it has been used for an analysis of demand for aggregate commodity groups. Ozuna and Gomez (1994) estimate a system of recreation demand functions using AIDS. Denton and Mountain (2004) apply the static AIDS model to investigate how demand elasticities vary with the degree of inequality in the income distribution using income data for seven countries. While the specifications of their conventional AIDS model are static, many studies have attempted to employ a dynamic approach with cointegration of time series data. Karagiannis, Katranidis, and Velentzas (2000), Li, Song, and Witt (2004) and Eakins and Gallagher (2003) apply the Error Correction Model (ECM) LA/AIDS to their studies on tourism demand and food consumption, respectively. To avoid the several drawbacks of ECM LA/AIDS, Kaabia and Gil (2001) and Iooty, Pinto, and Ebeling (2009) implement a Vector Error Correction Model (VECM) in their studies on demand system.

Although numerous studies on demand system have applied the static and dynamic form of AIDS model, they mainly focus on tourists' expenditure or food consumption (see also, for example, Duffy (1995), Johnson, Oksanen, Veal, and Frets (1992), Jung and Koo (2000)), and studies on demand for telecommunications are still rare. Among a few empirical studies that examine the demand for telecommunications, Choo, Lee, and Mokhtarian (2010) is the only study that considers the relationship between telecommunications and other existing goods/services, especially, transportation in US. Choo et al. (2010) apply the static AIDS to take an aggregate approach, and find a dominant effect of complementarity in the influence of telecommunications on transportation from the U.S Consumer Expenditure Survey over the period 1984–2002.

Regarding the demand function for telecommunications services in South Korea, only Lee and Lee (2012) address the questions concerning household expenditures on telecommunications and relationship with other expenditures, applying the AIDS model with aggregate data. Lee and Lee (2012) show that the Korean household demand for telecommunications became highly price elastic after the Internet service had begun. Their analysis also shows that telecommunications became complements for transportation, books and printed matter, and culture recreation service, but substitutes for culture and recreation durable goods. Although Lee and Lee (2012) explain structural changes in telecommunications expenditure in South Korea by estimating a demand function, their work assumes no structural changes in demand for telecommunications