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An empirical analysis of switching cost in the smartphone market in South Korea

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ABSTRACT

Switching cost is an important factor for policy makers to consider because it sets a higher price for locked-in consumers by making the market less competitive. Though there has been some empirical research analyzing switching costs in the mobile telecommunications market, studies considering the characteristics of smartphones, which have their own operating systems and applications, are still rare. In this study, we conduct a hypothetical conjoint survey to analyze switching cost in the smartphone handset market and derive the cost by using the hierarchical Bayesian multinomial logit model to consider respondents' heterogeneity. Switching costs of handsets and OS are empirically estimated, and the magnitudes depend on the levels of searching cost, learning cost, and uncertainty when purchasing new smartphones.

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1. Introduction

As noted in the previous research conducted by [Farrell and Klemperer \(2007\)](#) and [Klemperer \(1995\)](#), switching cost sets a higher price for locked-in consumers by making the market less competitive. The lock-in effect due to switching cost may also restrict consumer's choices, decrease utility, and cause less innovative firm behavior ([Cline, 2012](#)).

Switching costs have received much attention both theoretically and empirically because switching costs play an important role in analyzing market competition, firms' price strategies, and consumer welfare. Like other products, a smartphone also has important issues with the relationship between its switching cost and market competitiveness. [Frank \(2015\)](#) argues that consumers' switching costs should be critically considered because they affect market entry barriers or a dominant firm's discriminating behavior. [Kenney and Pon \(2011\)](#) note that several layers can arise due to the lock-in effect from Google with search engines, email, maps, and YouTube; Apple with their App store; Microsoft with MS office; and others. They also note that switching cost would be increased due to subsidies for smartphone devices from telecommunication companies inducing a one- or two-year contract and due to incompatibility between CDMA and GSM technologies.

[Cullen and Shcherbakov \(2010\)](#) and [Nakamura \(2010\)](#) estimated switching costs in mobile in the wireless industry. [Nakamura \(2010\)](#) evaluated lock-in effects of Subscriber Identity Module (SIM) cards in Japan and showed SIM unlock policies reduce consumer switching costs. [Cullen and Shcherbakov \(2010\)](#) concluded that switching costs for changing

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mobile service providers ranged from \$225.7 to \$236.3. They noted that there are additional hassle costs because early termination fees in the U.S. range from \$175 to \$200. Lee, Kim, Lee, and Park (2006) and Maicas, Polo, and Javier Sese (2009) investigated the effect of mobile number portability on switching costs. The adoption of mobile number portability significantly reduced switching costs in both studies. Although there have been a few studies that empirically analyze switching costs in the mobile telecommunications market, studies considering the characteristics of smartphones are hardly found. Although, up to now, contracts, mileage, and mobile number portability have been considered as major factors in mobile handset change, we should consider additional factors related to smartphone characteristics because market situations have changed. Smartphone users face new switching factors such as operating systems and the applications market.

One of the important characteristics of a smartphone is that it is possible to install various applications on it. However, the applications are not compatible among different operating systems (OS). This means a customer cannot use his/her own purchased applications after switching to a smartphone with a different operation system. In addition, there is a learning cost for using other smartphones. That is, a consumer accustomed to a current smartphone needs time and effort to be familiar with other smartphones with different operation systems or user interfaces.

In this study, we will discuss some implications of making a competitive mobile market, based on the empirical evidence on smartphone switching cost. The rest of this study is structured as follows: Section 2 briefly explores the switching costs of smartphones. Section 3 provides data and an econometric model for measuring switching costs. Estimation results are presented in Section 4 and Section 5 discusses the main findings.

2. Switching costs of a smartphone

Before smartphones emerged, the major players in the mobile market were telecommunication companies, device manufacturers, and mobile content providers. The telecommunication companies took important roles not only by providing mobile service but also by controlling mobile content distribution as gateways. However, as the smartphone came out, mobile content distribution has changed to open markets, such as in online application stores. This has limited the role of telecommunication companies to network service only.

Apple Inc. launched the iPhone and attracted third party content providers to their distribution platform where anyone could buy and sell applications freely. The downloaded applications were easily installed on smartphones and this extended the role of the mobile device from voice message exchange to a number of services. This change made the role of the OS providers, such as Apple or Google, much more important in the mobile market.

The application market, which is typically a two-sided market, shows network externalities. That is, the more customers and providers participate in the application market, the greater the utility given to both sides. In case of the OS, the iOS and Android OS, which are made by Apple and Google, respectively, are multisided markets that connect smartphone device manufacturers, application providers, and users. Hardware manufacturers, such as Samsung, Nokia, and Xiaomi, have tried to develop their own mobile OS because the OS platform has a powerful influence on both supply and demand. Application developers who want to provide their apps to a specific application market should follow the rules made by OS platform providers. The quantity and quality of applications affects consumers who want to use apps through their smartphones. Using these kinds of network effects, OS platform providers take the lead in the mobile ecosystem. The hardware manufacturers' endeavor to provide a heavyweight mobile OS has yet to produce any tangible results.

The switching costs of a mobile phone are economic and psychological costs caused by changing a mobile device or telecommunication service provider. In the case of smartphone change, the switching costs can be due to three reasons: change of telecommunication company, device, and/or OS platform. That is, changing an OS platform should be considered as an additional factor when we estimate the switching cost of smartphones, while device or telecommunication company only are usually considered for conventional mobile phones. If switching cost is high, consumers are likely to adhere to using current services or products. Switching cost hinders competition among service providers or manufacturers, though a number of players exist in the market. For this reason, switching cost is a worthy topic for analysis.

Klemperer (1987) classifies switching costs by transaction costs, learning costs, and artificial costs based on transaction stages. The transaction costs are incurred at the time of transaction, learning costs are incurred with the initial time of use it takes to be familiar with the products, and artificial costs are incurred while using the products due to firm strategies such as saving points or mileage.

Klemperer (1995) subdivides switching costs into six categories in his following study. The transaction costs and learning costs are the same as in previous studies, and the discount coupon is similar to the artificial costs. One of the added factors is incompatibility causing additional costs when purchasing a new product that is not compatible with a previously used product. For example, in the case of a smartphone, power cables, supplementary batteries, and other accessories may not be compatible with a new smartphone. In addition, applications may not be compatible with a new smartphone in general if the OS is different. The other factor is uncertainty indicating additional cost when a consumer is uncertain to the quality of a new product. The last factor is psychological costs such as brand loyalty.

Jones, Mothersbaugh, and Beatty (2002) classify the switching cost by three categories. The first factor is continuity costs, which are divided again by lost performance costs and uncertainty costs. The lost performance costs are benefits lost by changing a service or product and the uncertainty costs are the costs caused by anxiety that a new service or product might

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