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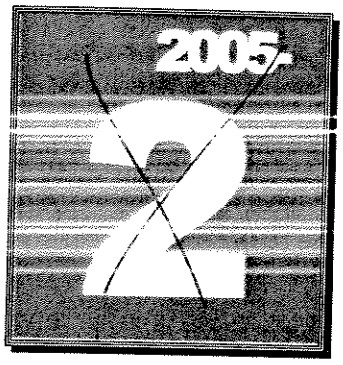

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Estimation of Switching Costs: Several Methods and the Multichannel Video Industry

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Estimation of Switching Costs: Several Methods and the Multichannel Video Industry

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Abstract

Switching costs are common in the lives of consumers, but frequently have negligible effects on substitution and competition. In some industries, however, switching costs have significantly affect consumer behavior and thereby the form of competition. In these industries, estimation techniques for measuring the size of switching costs and for examining the affects of switching costs can yield valuable insights into the reasons for observed behavior. We employ several methods of measuring switching costs in the multichannel video industry, for the purpose of examining both the measurement methods and the specific consequences of switching costs for consumers in the industry.

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I. Introduction

Switching costs are a common element of economic markets, existing in small amounts in many markets simply as a result of the expense of acquiring additional information on prices or quality, or as a result of the difficulty of acting on such information. In many cases, the effects are minor, allowing producers some small, temporary pricing flexibility, but not strong immunity from price competition. In other markets, however, switching costs are significant enough to dampen price competition and noticeably affect consumer behavior. Previous work (Wise and Duwadi (2005)) indicates that the multichannel video industry is an industry in which switching costs significantly affects consumer behavior and competition among producers.

[Need to summarize results here when available.]

Given the prevalence of switching costs, it is important to develop methods to detect the presence of switching costs, and to measure their effects. A variety of methods have been proposed, and this paper uses several methods to investigate the presence and role of switching costs in the multichannel video industry. Wise and Duwadi (2005) detected the presence of switching costs previously, indicating the suitability of the industry for an inquiry of this type, but made certain simplifying assumptions that call for further study.[1] The study contained herein removes these simplifying assumptions and thus more accurately examines switching costs in this context.

The paper is organized as follows. Section II provides background and reviews the relevant literature. Section III presents the methods employed to examine switching costs. Section IV reviews the data set used. Section V presents the results from the econometric models used. Section VI concludes the paper and comments on the policy implications of the results.

II. Background and Literature Review

Switching costs occur when consumers perceive or incur some cost when switching from one provider of a good or service to another. Obviously, such costs are common, but frequently are small, and in many markets can be ignored because of their trivial nature. In some industries, however, switching costs are higher and thus take on a much more important role in consumer decision making, by limiting substitution and thus dampening price competition. In short, where switching costs exist, a provider can raise prices above those of a rival and retain customers, as long as the price difference is less than the cost to consumers of switching.

The multichannel video industry consists of distributors of multichannel service, which purchase or produce video programming networks and sell them in packages to consumers. The choice of multichannel video distributor is determined by where a

[1] Wise and Duwadi (2005) assumed that using a per channel rate for cable price allowed treatment of cable television service and Direct Broadcast Satellite service as homogenous goods. While this is not an unreasonable assumption, consumers purchase these services in large bundles rather than channel by channel, so the assumption abstracts somewhat from the market. In this paper, the services are treated as differentiated products purchased in bundles, more closely approximating consumer behavior.

consumer lives: the vast majority of consumers have available to them one cable system operator and two Direct Broadcast Satellite (DBS) providers, and a few local areas also have the choice of a second cable operator (or overbuilder) or a wireless multichannel video provider. Monthly charges for multichannel video service include those for video service and for recurring equipment rental costs. Setup costs may include charges for installation and for equipment.

Klemperer (1987) identified three types of switching costs: transaction costs, learning costs, and artificial or contractual costs. All three of these types of switching costs are present in the multichannel industry. Transaction costs include installation costs and delays in installation of service (i.e., scheduling of installation and waiting at home for installation). Learning costs include researching new services in order to switch (which may be significant given differences between the services) and learning how to use new services (which will be more significant for consumers moving from an older cable service to more modern DBS service). Contractual costs come from long-term contracts required to lower DBS equipment and installation costs.

Many studies of switching costs in other industries have been performed. See Klemperer (1995) for a survey of the literature on switching cost theory. For further detail, see Klemperer (1987a), (1987b), (1992), Beggs and Klemperer (1992), and Klemperer and Padilla (1997). Other useful studies or references include Chen and Hitt (2002), Knittel (1997) (studying another telecommunications service, long distance telephone), Shy (2002), the United Kingdom's Office of Fair Trading (2003), Elzinga and Mills (1998), Carlsson and Löfgren (2004), and Kim, Kliger, and Vale (2003). This paper uses and modifies methods found in the Office of Fair Trading (2003) and Shy (2002), and then add additional techniques to validate and expand upon them.

Wise and Duwadi (2005) studied switching costs in the multichannel video industry, finding econometric evidence of their existence, most notably the fact that cable price has a statistically significant effect on DBS penetration when cable price rises or falls by greater than ten percent. No other study of switching costs in the multichannel video industry exists, but others have examined competition in the multichannel video industry. Recent work by the FCC and General Accounting Office found significant cable price decreases and cable quality increases where cable overbuild competition exists, but cable price increases everywhere else (GAO, 1999; FCC, 1999-2003). Goolsbee and Petrin (2004) found that premium cable is a closer substitute for DBS than the equivalent of cable's most popular services, but also that all cable subscribers enjoy substantial welfare gains from the entry of DBS from lower cable prices and higher cable quality. Savage and Wirth (2005) found that overbuild entry is more likely in monopoly cable markets with high population density, income, and household growth, and that cable operators in these markets offered more channels with a lower price per channel for basic service, but without examining the effects of DBS competition. GAO (2002) found that the ability of DBS operators to offer local broadcast channels to a local community raised penetration in that community, but did not affect cable prices.

The current paper is useful generally and for the multichannel video industry, specifically. Generally, it adds to scholarship by taking a broad look at several methods

of measuring switching costs. For the multichannel video industry, it expands upon the work of Wise and Duwadi (2005) in examining the effects of switching costs upon the dynamics in that industry. These are the significant contributions of this study.

III. Empirical Methods

This study employs several methods to detect the existence of, and measure the effects of, switching costs. The multichannel video industry is a good candidate for testing various methods of examining switching costs because Wise and Duwadi (2005) previously detected evidence of switching costs in the industry and because appropriate data were available for this industry. This paper represents an improvement upon Wise and Duwadi (2005), however, because: (1) the methods used are generally applicable, i.e., can be used to test for switching costs in a wide variety of industries; and (2) it examines cable television and DBS as differentiated products, rather than as homogenous products.[2]

Multichannel video providers sell various packages of channels for a fee, and both the fees and the contents of the packages differ. Thus, while there are great similarities between the services (e.g., many of the channels offered in similar packages are the same), there is some clear differentiation between the products. Additionally, cable service is divided into local franchises, so that frequently neighboring communities receive drastically different cable service. DBS service, by contrast, is offered in nearly homogenous form to the entire country.

The Office of Fair Trade (2003) model allows examination of firm-level (in the case of MVPDs, locality-level) of differentiated products for the existence of switching costs. We first estimate this model. The model can be summarized as follows:

$$Q_{it} = \beta_0 + \beta_1 P_{it} + \beta_2 P_{jt} + \beta_3 Q_{jt+1} + \beta_4 Q_{jt-1} + \beta_5 D_{it} + \sum_{j=1}^{n-1} \gamma_j I_j + \sum_{k=1}^{T-1} \alpha_k T_k + \varepsilon_{it} \qquad (1)$$

where:

- Q_{it} is quantity sold of product i in period t;
- Q_{jt} is quantity sold of all j potential substitutes in periods t-1 and t+1;
- P_{it} is the price of product i in period t;
- P_{jt} is the price of all j potential substitutes in period t;
- D_t is a vector of demand-shift variables;
- I_j and T_k are individual and time fixed effects (0/1 dummy variables); and

[2] As noted above (see, supra, fn. 1), Wise and Duwadi (2005) made the simplifying assumption that cable and DBS are homogenous products. While the model in that paper is adjusted to accommodate this assumption, it is clear that there is some differentiation between the products. Therefore, the empirical methods employed in this paper represent a deeper examination of the question, with assumptions closer to the real world.

- ε_{it} is the random error.

The Office of Fair Trade (2003) model uses measures of lagged and future consumption to calculate the cross-price elasticity of consumption between periods. The simple intuition is that a negative cross-price elasticity of consumption between periods indicates the presence of switching costs. In other words, finding long run price elasticity significantly greater than the short run elasticity provides further evidence of the existence of switching costs.

We next calculate the magnitude of switching costs. Shy (2002) presents a simple method for calculating the magnitude of switching costs. In a multifirm market, in which market shares, N are indexed 1 through I, such that $N_1 > N_2 > \ldots > N_I$, all firms $i \neq I$ fear being undercut by firm I, and thus set their prices, p_i, in reference to the price of firm I. Firm I fears being targeted by the largest firm, and thus sets its price so that firm 1 will not find it profitable to undercut its price. Switching costs for firms $i \neq I$, S_i, can be calculated with the following equation:

$$S_i = p_i - \frac{N_I p_I}{N_i + N_I}, i \in \{1,\ldots, I-1\}. \quad (2)$$

The switching costs for firm I, S_I, can be calculated with the following equation:

$$S_I = p_I - \frac{N_1 p_1}{N_1 + N_I}. \quad (3)$$

This method obviously makes the simplifying assumption that all consumers face the same switching cost, which may not be true. Still it calculates switching costs as calculated at the firm level, and represents firm behavior in the presence of switching costs. The multichannel video industry is a good candidate for calculating these equations because there is likely to be substantial variation in switching costs between markets. In most markets, consumers can choose between the incumbent cable provider and two DBS providers, but cable provider characteristics, such as provision of advanced services, and community characteristics that affect the quality and availability of DBS service, such as latitude and DBS provision of local broadcast channels, will affect consumer willingness to switch between services. Additionally, a few communities also can choose from a second cable operator, or "overbuilder." Previous studies have shown substantial difference in pricing in communities with overbuilders than other communities, and we expect substantial differences in switching costs for these communities also.

To examine the sources of switching costs for the multichannel industry, we next estimate a hedonic equation of the form:[3]

$$S_1 = \beta_0 + \beta_1 D_{it} + \sum_{j=1}^{n-1} \gamma_j I_j + \sum_{k=1}^{T-1} \alpha_k T_k + \varepsilon_{it}$$

[3] Carlsson, F. and Å. Löfgren (2004) perform a similar procedure, but for the airline industry.

with the switching cost for cable consumers in each community, S_1 above, as the dependent variable. Independent variables are vectors of community and service characteristics that may contribute to switching costs for consumers: D_t is a vector of demand-shift variables, I_j and T_k are individual and time fixed effects (0/1 dummy variables), and ε_{it} is the random error. As a result, we examine the factors that contribute to switching costs for cable consumers.

Finally, we embed the switching cost estimated above in a system of equations for the cable industry. The equations take the form:

Given this formulation, we can estimate the elasticity of switching costs, the marginal effects, and the welfare effects. This allows a test and validation of the other methods used previously in

Table 1

Sample Table

Table 2

A Second Sample Table

Table 3

Sample Table for Regression Results: The Full Model Regression Coefficients and Goodness of Fit Statistics

(t-statistics in parentheses)

Variable	Estimated Coefficient	t Statistic
Log (Expected Share)	1.39***	(9.38)
Log (Total Viewers)	0.05	(1.47)
Percentage Upper-Income	0.01**	(2.55)
Percentage 18-34	-0.00	(0.02)
Gender Concentration	0.01*	(1.88)
Sitcom	0.20**	(2.52)
News	-0.26***	(3.81)
Police	-0.26***	(3.10)
Genx	0.16**	(2.06)
Ethnic	0.08	(0.46)
Teens or Children	-0.12*	(1.76)
Sports	0.09	(1.01)
Late	0.13*	(1.97)
Constant	7.01***	(22.27)
Observations	71	
Adjusted R-Squared	.83	
F-Statistic	27.74***	

*** - *significant at 99% confidence level*, ** - *significant at 95% confidence level*, * - *significant at 90% confidence level*

References

Beggs, A. and P. Klemperer. 1992. Multi-period competition with switching costs. *Econometrica.* 60:651-666.

Carlsson, F. and Å. Löfgren. 2004. Airline choice, switching costs and frequent flyer programs, *Working Papers in Economics No. 123,* Department of Economics, Gothenburg University. Available at http://www.handels.gu.se/epc/archive/00003341/01/gunwpe0123.pdf.

Chen, Pei-Yu (Sharon) and L. M. Hitt. 2002. Measuring switching costs and their determinants in internet-based business. *Leonard N. Stern School of Business, New York University Information Systems Research Seminar Series.*

Elzinga, Kenneth and Mills. 1998. Switching costs in the wholesale distribution of cigarettes. *Southern Economic Journal.* 65(2):282-293.

Federal Communications Commission. 1999-2004. *Annual review of cable industry prices,* MM Docket No. 92-266. (This refers to five separate reports, released annually. Each report contains data from the previous three years, so that the 2003 report contains 2000-2002 data.)

_____. 2005. *Annual assessment of the status of competition in the market for the delivery of video programming.*

General Accounting Office. 1991. *Telecommunications: 1991 survey of cable television rates and services.*

_____. 1999. *The changing status of competition to cable* television.

_____. 2000. *Telecommunications: the effect of competition from satellite providers on cable rates.*

_____. 2002. *Telecommunications: issues in providing cable and satellite television services.*

_____. 2003. *Issues related to competition and subscriber rates in the cable television industry.*

Goolsbee, A. and A. Petrin. 2004. The consumer gains from direct broadcast satellites and the competition with cable TV. *Econometrica.* 72:351-381.

Karikari, J. A., S. M. Brown, and A. D. Abramowitz. 2003. Subscriptions for direct broadcast satellite and cable television in the US: an empirical analysis. *Information Economics and Policy.* 15:1-15.

Kim, Moshe, Doron Kliger, and Bent Vale. 2003. Estimating switching costs: the case of banking. *Journal of Financial Intermediation.* 12:25-56.

Klemperer, P. 1987. Entry deterrence in markets with consumer switching costs. *The Economic Journal.* 97:99-117.

_____. 1987. Markets with consumer switching costs. *Quarterly Journal of Economics.* 102:375- 394.

_____. 1987. The competitiveness of markets with switching costs. *RAND Journal of Economics.* 18:138-150.

_____. 1992. Equilibrium product lines: competing head-to-head may be less competitive. *American Economic Review.* 82:740-775.

_____. 1995. Competition when consumers have switching costs: an overview with applications to industrial organization, macroeconomics, and international trade. *Review of Economic Studies.* 62:515-539.

Klemperer, P. and A. J. Padilla. 1997. Do firms' product lines include too many varieties? *RAND Journal of Economic.* 28:472-488.

Knittel, C. R. 1997. Interstate long distance rates: search costs, switching costs, and market power. *Review of Industrial Organization.* 12:519-536.

Savage, S. J. and M. Wirth. 2005. Price, programming and potential competition in US cable television markets. *Journal of Regulatory Economics.* 27 (1): 25-46.

Shy, Oz. 2002. A quick and easy method for estimating switching costs. *International Journal of Industrial Organization.* 20:71-87.

Singer, H. J. 2003. *Does clustering by incumbent cable MSOs deter entry by overbuilders?* Working Paper.

United Kingdom Office of Fair Trading. Department of Trade and Industry. 2003. *Switching cost.* Economic Discussion Paper 5.

Wise, Andrew S. and Kiran Duwadi, Competition between cable and direct broadcast satellite – it's more complicated than you think, *Media Bureau Staff Research Paper No. 2005-1, International Bureau Working Paper No. 3,* January 2005, available at http://www.fcc.gov/mb/mbpapers.html.