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by

Sangho KIM and Donghyun PARK

Economic Growth Centre
Division of Economics
School of Humanities and Social Sciences
Nanyang Technological University
14 Nanyang Drive
SINGAPORE 637332

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Addictive behavior in cinema demand: evidence from Korea

Sangho KIM[*] and Donghyun PARK[+]

Abstract

It is intuitively plausible that the demand for cinema services may be partly driven by addiction or habit. Yet there is almost no empirical literature which tests for whether cinema demand is addictive. We estimate addiction models for cinema demand using Korean time series data from 1963 to 2004. Our estimation results indicate that (i) addictive behavior characterizes the demand for cinema services, (ii) this behavior is rational, and (iii) habit is one of most important determinants of cinema demand. Our results also reveal that cinema attendance is generally insensitive to admission price and unrelated to income.

JEL codes: Z10, D12, C32, L82

Keywords: Cinema demand, rational addiction, myopic addiction, two-stages least squares, time-series analysis

[*] Corresponding Author, Professor, College of Business, Honam University, Gwangju 506-714, KOREA Email: shkim@honam.ac.kr, Telephone: +82-62-940-5394, Fax: +82-62-940-5116

[+] Principal Economist, Economics and Research Department (ERD), Asian Development Bank (ADB), 6 ADB Avenue, Mandaluyong City, PHILIPPINES 1550. Email: dpark@adb.org, Telephone: +63-2-632-5825, Fax: +63-2-636-2342

1 Introduction

The demand for cultural goods and services evolves over time as a result of the gradual cultivation of consumer tastes. Learning-by-consuming is a unique feature of cultural goods and services which differentiates them from other types of goods and services [see McCain (1979)]. Current demand for cultural goods is dependent on past consumption of those goods, and future demand is dependent on current consumption. According to rational addiction theory, such time dependency of demand can reflect rational behavior [see Stigler and Becker (1977), Becker and Murphy (1988) and Becker *et al*. (1994)]. For example, exposure to classical music in the past is likely to increase one's appreciation of and hence demand for classical music in the present. Likewise, having followed a TV soap opera in the past makes it easier to follow the plot in the present.

A number of cultural economics studies have found that tastes acquired through past consumption play a key role in the consumer's understanding and enjoyment of high performing arts such as opera, classical music, jazz, classical and modern dances, and avant-garde art. Most empirical studies of addictive behavior in the demand for cultural goods have focused on high art [see McCain (1979, 1981), Champarnaud (1997) and Brito and Barros (2005)]. Even though cinema is also a performing art form, addictive demand for cinema has not received a lot of attention among researchers. This is puzzling since economic intuition suggests that cinema demand is likely to be driven at least partly by addiction or habit. Although learning costs are probably lower for cinema than high art, past movie viewing can still increase the utility of future movie viewing. Sequels of commercially successful movies are perhaps the most obvious example, but more generally, familiarity with and preference for certain actors or directors based on past

experience may have a positive impact on current demand. Moreover, people develop and retain habits in almost every aspect of their daily life [see Becker and Murphy (1988)]. It is possible to think of the whole movie-going experience, from going out to a cinema to watching a big screen to eating popcorn, as an entertainment habit formed through years of experience.

Understanding movie-going habits can help the movie industry design more effective marketing strategies. For example, discounting ticket prices for teenagers and children will generate less revenue in the short run if movie demand is inelastic. However, the strategy may be profitable in the long run if those young customers become regular movie-goers in the future as a result of their early and inexpensive exposure to movies. Therefore, it may be sensible in the long run for the movie industry to encourage consumers to acquire a taste for movie going even if doing so entails short-term costs. Furthermore, it is possible that certain types of movies more addictive than others. This can influence the nature of the industry's products in the long run. For example, consumer addiction to violent movies may lead to increased demand for such movies and hence greater production of such movies. Such effects can have social and economic effects beyond the profitability or the output mix of the movie industry. A widely expressed if unproven concern is that watching too many violent movies can lead to imitative violent behavior by movie goers.

The primary contribution of our study is to add to the almost non-existent empirical literature on addictive behavior in the demand for cinema services. Our review of the literature yielded only one study – Cameron (1999) – which empirically investigated the issue of addictive movie-going. Given the intuitively plausible grounds for addictive and

habit-based cinema demand, this is somewhat surprising. Using pooled regional time-series data for the United Kingdom from 1965 to 1983, Cameron finds evidence against the rational addiction hypothesis for instrumental variable estimations, but supportive evidence for ordinary least squares (OLS) estimations. Overall, Cameron finds at best only limited empirical support for the rational addiction model. However, Cameron did not perform unit root tests to test for the stationarity of the time-series data, despite the risk of a spurious relationship. Building on Cameron's study, we use Korean time-series data from 1963 to 2004 to empirically test for whether cinema demand is addictive.

The Korean movie industry is almost unique in that it has thrived in the face of competition from Hollywood.[1] The Korean government has long protected the domestic movie industry by restricting foreign imports. From the early 1960s until 1986, the government directly restricted foreign cinema imports. Since 1986, the government used a screen quota requirement to the industry. The screen quota system originally limited foreign films' access to the Korean market by requiring local cinemas to show Korean-made films on 146 out of 365 days. However, the quota was cut to 73 days in July 2006 as a result of bilateral trade negotiations with the US.[2] Our study provides some useful insights into inter-temporal behavior in cinema demand which will benefit the global movie industry which is coping with competitive challenges from new forms of entertainment such as the Internet. To the extent that movies can have far-reaching social and economic effects, our study also has some meaningful implications for policymakers.

2 The Model and Variables

[1] In only two countries besides the U.S. do domestic movies hold a majority of the box office; India imports almost no Hollywood movies, and Korea has a screen quota system.

[2] The screen quota became effective with the elimination of direct import restrictions; although the quota had existed since 1958, it had been moot due to the direct import restraint.

In this section, we discuss the cinema addiction model which provides the basis for our empirical analysis, as well as the determinants of demand for cinema services.

2.1 The Cinema Addiction Model

Cook and Moor (1995) developed a model of addictive good demand based on a "myopic" assumption under which the consumer bases his present consumption on past consumption but does not anticipate that future consumption depends on past and present consumption. The consumer's utility is then a function of past and present consumption of the addictive good as well as consumption of a composite good with unit price. Assuming addictive cinema demand, the consumer's utility function can be defined as

$$U_t = U(Att_t, Att_{t-1}, C_t), \tag{1}$$

where U, $Attr_t$ and C_t represent utility, consumption of addictive cinema services at period t and consumption of composite good at period t, respectively. The budget constraint can be written as $P_t Att_t + C_t = Y_t$, where P_t and Y_t denote cinema admission price and income, respectively. Assuming constant marginal utility of income and a quadratic utility function, we can express the demand for addictive cinema services as

$$Att_t = \alpha + \beta_1 Att_{t-1} + \beta_2 P_t + \beta_3 Y_t. \tag{2}$$

The coefficient of past consumption must be significant and positive if cinema demand is characterized by myopic addiction.

In the more general model of rational addiction, a consumer takes into account both past consumption and future consumption in deciding present consumption [Becker and Murphy (1988)]. Consumers are "rational' in the sense that they anticipate future consumption of addictive services because they understand that present consumption will affect future consumption. This means that the consumer will consider the effect of

present consumption on future consumption when deciding present consumption. Therefore, cinema demand depends on both past and future consumption. The consumer maximizes the discounted sum of his utility at each period in his lifetime.

$$U = \sum_{t=0}^{\infty} \delta^t U(Att_t, Att_{t-1}, C_t), \tag{3}$$

where δ is the discount factor. The consumer's budget is constrained by the present value of his lifetime income.

$$\sum_{t=0}^{\infty} \delta^t (P_t Att_t + C_t) = Y \tag{4}$$

.

In the more general model of rational addiction, we can express the demand for addictive cinema services as

$$Att_t = \alpha + \beta_1 Att_{t-1} + \beta_2 Att_{t+1} + \beta_3 P_t + \beta_4 Y_t . \tag{5}$$

Coefficients β_1 and β_2 should be positive and significant in the presence of rational addiction. Past consumptions and present consumption are complements, as are present consumption and future consumption.

2.2 The Variables

Cinema demand is conventionally measured by per capita cinema attendance (*Attr*), which is total attendance deflated by the population size. Demand for cinema is affected by a variety of factors, including the admission price, income and price of substitutes, as well as the two variables suggested by the addiction model – past and future consumption. The rational addictive cinema demand function in (5) can be expanded as

$$Att_t = \alpha + \beta_1 Att_{t-1} + \beta_2 Att_{t+1} + \beta_3 P_t + \beta_4 Y_t + \beta_5 P_t^o + \beta_6 A_t^d + \varepsilon_t , \tag{6}$$

The amount of cinema demanded in period t ($Attr_t$) is a function of past consumption

($Attr_{t-1}$), future consumption ($Attr_{t+1}$), admission price (P_t), the price of substitutes or complements (P_t^o), income (Y_t), and a vector of other variables (A_t^d) that affect a consumer's preferences; ε_t is the error term of the model. We used per capita income for income since we used per capita cinema demand for cinema demand.

We expect cinema demand to be negatively related with admission price and the price of complements but positively related with income and the price of substitutes. Cinema has many substitutes that are easily accessible to consumers, including television, videotape recordings (VTR), art exhibitions, musicals, circus and other forms of popular entertainment. Therefore, cinema demand should be price elastic. However, income elasticity is influenced by whether cinema is a luxury good or not. The small admission price might suggest that cinema is not a luxury good. However, some studies have found that consumption of arts is associated with education, which is related to income. If this is the case for cinema, income elasticity can be greater than one. On the other hand, addictiveness and habit will create inertia which limits substitution and income effects, thereby lowering price and income elasticity.

Although substitutes to cinema services include a wide range of cultural goods and leisure goods, the most immediate alternatives to cinema services include cable and non-cable TV and videotape recordings (VTR). The diffusion of these media will have a potentially big effect on cinema demand. TV competes directly with cinema by providing similar services in the more convenient and often more comfortable home environment. The diffusion of TV set ownership and the proliferation of diverse TV programs have given TV a competitive edge against cinema. Furthermore, the emergence of VTR and cable TV has further broadened the range of consumer choice, making TV more

attractive to consumers. To investigate the influence of these various TV-based goods on cinema demand, we use the number of TV sets registered as an explanatory variable. We also dummy variables to represent the year when VTRs were produced domestically and thus became widely available, along with the year of cable TV's inception.[3] We also incorporate into our analysis the admission price for cultural facilities and the consumer price index for entertainment and leisure activities.

Other important factors that influence cinema demand include the variety and quality of movies on the market. More and better movies will induce more people go to cinemas. An increase in the number of movies, whether produced domestically or overseas, will increase consumer choice. The increase in consumer choice, in turn, is likely to increase demand, although this may not necessarily be the case.[4] The impact of quality on cinema demand is most evident from the fact that a few blockbuster movies can account for a large portion of total cinema attendance. This blockbuster effect occurs in Korea, where a succession of movies selling a million tickets or more has been produced since the cinema boom took off in the late 1990s. However, estimating the impact of quality on cinema attendance is difficult because there are no objective characteristics of movie quality. Measures of movie quality reflect subjective judgment, and critics' opinions of movies are not necessarily consistent with indices of consumer choice such as box office performance and TV reruns [see Ginsburgh and Weyers (1999)]. Despite these complications, many studies relate movie quality to box office results or rental income,

[3] Since 1963, TV sets in Korea are registered and owners must pay a specified fee to finance public broadcasting.

[4] The greater the choice set, the less likely it is that different people will watch the same movie. Part of the pleasure of watching movies is chatting about a movie with other people and this part of the movie-watching experience decreases when the choice set grows. That is, a greater choice set reduces the network effect of watching movies.

using reviews by critics and awards as quality proxies.[5]

However, no study has explicitly taken into account the variety and quality of movies in estimating cinema demand. In this study, we use the number of movies produced domestically and imported as our measure of movie variety. As noted earlier, it is difficult to estimate the impact of quality on cinema attendance since there are no objective measures of movie quality. As a second best, we use as our quality measures the unit price of movie exports and imports.[6] The unit export and import price of movies are determined by both supply and demand factors. For example, the success of a movie is ultimately determined by consumer choice, and successful movies will command higher prices in the export market. Therefore, our measure of quality is determined by market forces. We use time-series data from 1963– 2004 for the Korean motion picture industry. Table 1 below presents the variable descriptions, abbreviations and data sources. All nominal variables have been converted into real terms with 2000 as the base year.

[Insert Table 1 here]

3 Estimation Results

In this section, we report the results of our empirical analysis. The first sub-section examines the effect of non-addictive variables on cinema attendance while the second sub-section looks at the effect of addictive variables.

3.1 Determinants of Cinema Demand

Prior to empirical analysis, we performed the standard unit root tests – augmented Dickey–Fuller (ADF), Phillips–Peron (PP), and Kwiatkowski, Phillips, Schmidt, and

[5] For a discussion of the literature, see Ginsburgh and Weyers (1999).

[6] Admittedly, there is an element of circularity in using unit prices as a measure of quality. We are estimating demand as a function of quality but our measure of quality is unit price, which is dependent on demand. This is less of a problem for the unit price of exports since it is determined largely by foreign demand rather than Korean demand.

Shin (KPSS) unit root tests – to examine whether the time series of variables have stochastic trends. Table 2 below reports the test results for levels and first differences. The tests unambiguously suggest the existence of one unit root for most variables, indicating that the time series of all variables are integrated of order 1, $I(1)$. The exceptions are admission price for cultural facility, the number of movie exports, and the number of TV sets, which are integrated of order 0, $I(0)$.

[Insert Table 2 here]

We performed Johansen's cointegration test on various sets of variables to check for the existence of a long-run relationship among the variables. Table 3 below presents the maximum likelihood ratio statistics of these tests. The test results indicate that there is no cointegration vector among the demand-side variables, implying an absence of long-run relationships.

[Insert Table 3 here]

Based on these results, we estimate the cinema demand function using the first differences of all the variables. We derived the estimation equation (7) by differencing (6) as follows:

$$\Delta Att_t = \alpha + \beta_1 \Delta Att_{t-1} + \beta_2 \Delta Att_{t+1} + \beta_3 \Delta P_t + \beta_4 \Delta Y_t + \beta_5 \Delta P_t^o + \beta_6 \Delta A_t^d + \varepsilon_t \qquad (7)$$

In the actual estimation, we took the natural log of all variables. We selected the lags of the explanatory variables by the "general-to-specific" method, in which the most insignificant lagged variable is eliminated iteratively from the set of all lagged variables.

Table 4 below presents the empirical results we obtain when we exclude addictive explanatory variables from the estimation. The dependent variable is per capita cinema attendance, or total cinema attendance divided by the total population. Model (i) is the

most basic model with admission price, income, number of domestic movies and imported movies, unit price of movie export and imports, and number of TV sets as the explanatory variables. Models (ii), (iii) and (iv) include additional exogenous variables such as the price of related goods and dummy for cable TV.

[Insert Table 4 here]

The coefficient estimates show the impact of the explanatory variables on cinema attendance. However, the estimates do not represent the elasticity of demand with respect to the explanatory variables because all our variables have been first-differenced. Instead, we can interpret the coefficient estimates more accurately as the short-run effect of change in explanatory variables on change in cinema attendance. For example, the estimated coefficient on income measures the short-run effect of change in income on change in cinema attendance.

All the coefficient estimates except income have the expected signs, and most are statistically significant. Higher admission price reduces cinema attendance but the coefficient is significant only in models (i) and (ii). Higher income unexpectedly reduces attendance but the effect is insignificant. An increase in the number of both domestic and imported films has a significantly positive impact in all the models. The coefficient of the unit import price is significant in every model, but the coefficient of the unit export price is significant only in Model (ii). Wider access to TV sets has a negatively significant influence on movie attendance in Model (ii).[7] The results for Models (iii) and (iv), which incorporate related goods, indicate that the admission price of other cultural facilities has

[7] Fernandez-Blanco and Banos-Pino (1997) and Macmillan and Smith (2001) showed that the diffusion of TV reduced cinema demand in Spain and England, respectively. Dewenter and Westermann (2005) reported that TV is a substitute for cinema services in Germany but that VTR had an insignificant effect on cinema demand.

a significantly positive impact on attendance, but the consumer price index of leisure and entertainment services has a significantly negative impact. This suggests that other cultural facilities are a substitute for cinema while leisure and entertainment services are a complement. Our results for Model (iv) reveal that cable TV significantly increases cinema attendance. This implies that cinema services and cable TV are complements.

Our results show that in the short run cinema demand responds little to admissions price and is not affected by income. It may seem that our results contradict a number of earlier studies which found high income and price elasticity for cinema demand. However, those earlier results generally reflect long-run elasticity and were based on regressions which involved levels rather than differences of explanatory variables.[8] Our evidence also shows that an increase in the variety and quality of movies has a positive impact on cinema attendance. Our measures of variety – the number of domestic and imported movies – had a bigger impact than our measures of quality – the unit price of movie imports and exports. These results imply that variety matters more for consumers than quality. Greater choice increases the utility from cinema attendance and thereby encourages consumers to switch from other leisure activities to movie going. That is, in light of the diversity of consumer preferences with respect to movies, we can expect more consumers to go to cinemas when they face a larger selection of movies to choose from. The quality of movies, measured by the unit price of imports and exports, also has a positive impact on cinema demand, although the impact is smaller than that of variety.

Perhaps the most interesting result in Table 4 is that cinema admission price has an effect on attendance in Models (i) and (ii) but this effect disappears in Models (iii) and

[8] A number of earlier studies found that cinema demand is elastic to the admission price, while the evidence for income elasticity is mixed [see Cameron (1986), Macmillan and Smith (2001), Fernandez-Blanco and Banos-Pino (1997) and Dewenter and Westermann (2005)].

(iv). An equally interesting result is that income does not have an effect on cinema attendance in all four models. Our finding that own-price and income have at best limited effect on cinema attendance is somewhat surprising since those two variables are major determinants of demand for most goods and services. Our evidence suggests factors other than price and income play a relative big role in cinema demand. In particular, our evidence is consistent with the addiction model, which predicts that demand responds little to changes in own-price and income since inertia from past consumption accounts for a substantial part of current consumption. Therefore, our results imply that the demand for cinema services in Korea may be characterized by addictive behavior, as discussed further in the following section.

3.2 Addictive Behavior in Cinema Demand

In this sub-section, we report the empirical results we obtain when we include in the analysis explanatory variables associated with addictive behavior, in addition to the non-addictive explanatory variables discussed above. Table 5 below reports the coefficient estimates of myopic addiction models in which past cinema attendance ($Attr_{t-1}$) is added as an explanatory variable to Model (iv) in Table 4. The first column shows OLS estimates while the other three columns show two-stage least squares (2SLS) estimates. In the 2SLS estimation, past consumption is considered an endogenous variable since it is highly likely that unobserved variables which affect current utility (ε_t) are serially correlated [see Becker *et al*. (1994)]. The instruments used in Model (i) consist of all exogenous variables as well as one-period lags of these variables. Model (ii) adds the number of screens, $\Delta \log(Scn)_{t-1}$, and its one-period lag, $\Delta \log(Scn)_{t-2}$. Model (iii) adds two more lagged variables of the admission price, $\Delta \log(P)_t$, along with the number of

screens, $\Delta \log(Scn)_{t-1}$.

[Insert Table 5 here]

As suggested by Davidson and Mackinnon (1993), we performed the Hausman test to test for the exogeneity of past consumption. The test results of all models reject the null hypothesis that past consumption is endogenous. As a result, we will focus on the OLS estimates in our discussion, even though we report the 2SLS estimates as well. In any case, the OLS and 2SLS estimates differ substantially in only one respect – wider access to TV sets was significant in OLS but not in 2SLS.

Our variable of primary interest, past cinema attendance ($Attr_{t-1}$), has a positive and significant impact on current attendance in every model. This suggests that habit or addiction is indeed an important determinant of cinema demand. More precisely, our estimation results confirm the presence of myopic addictive behavior and show that the myopic addiction model explains cinema attendance better than Model (iv) in Table 4. Besides lending support to myopic addiction, our results also confirm that price and income have at best marginal effect on Korean cinema demand. In fact, although price had a significant effect on demand in Model (i) and (ii) in Table 4, both price and income are insignificant in all four models in Table 5. Greater availability of TV sets becomes significant and the price of related goods becomes more significant but the number of domestic movies loses significance. Overall, our results in Table 5 lend support to myopic addictive demand for cinema services.

As discussed earlier, the rational model of addiction expands upon the myopic model of addiction by incorporating future attendance ($Attr_{t+1}$) as an additional explanatory variable. Therefore, cinema demand at any given time depends on both past demand and

($Attr_{t-1}$) and future demand ($Attr_{t+1}$). Table 6 below reports the results of our estimation of the rational addiction model of cinema demand by OLS and 2SLS methods. In the 2SLS estimation, we treated both past cinema demand ($Attr_{t-1}$) and future demand ($Attr_{t+1}$) as endogenous variables. This is not only because the unobserved variables which affect current consumption might be serially correlated, but also because past consumption depends on ε_t due to consumer optimization. In this connection, we estimated De-Min Wu's (1973) F-statistics to test for the exogeneity of both past and future consumption. The test results cannot reject the null hypothesis that the two consumptions are endogenous. As a result, we will focus our discussion on the 2SLS estimates although we also report the OLS estimates. The two estimation methods produce similar results, the only major difference being the insignificance of the unit price of imported movies in Model (iii) under 2SLS. The 2SLS model instruments are identical to those used in the myopic addiction model except that we added one-year leads of all exogenous variables.

[Insert Table 6 here]

The estimated effects of past and future consumption on current consumption are significantly positive in all four models, implying the existence of rational addiction in cinema demand. This suggests that past consumption of cinema services influences consumer perception of current and future consumption. The consumer then rationally maximizes the life-time utility derived from life-time consumption of cinema services. It is also noteworthy that the estimated own price and income coefficients are insignificant in every model, in line with our results for the myopic addiction model. Our results for both rational and myopic addiction models imply that addictive demand may be a more

important determinant of Korean cinema demand than own price or income. Our finding that cinema demand is not responsive with respect to own price and income is consistent with some micro-level studies of cultural goods.[9]

Britos and Barros (2005) argue that if the low own-price and income elasticity of demand is a common characteristic of all cultural goods, it is likely that addictiveness is an important determinant of the demand for cultural goods, which is consistent with our evidence.[10] Finally, our findings indicate that addictiveness is stronger for imported movies than for domestic movies. In the addictive demand models, we found Korean cinema demand to be responsive to the number and unit price of imported movies but not responsive to the number of domestic movies and the unit price of exported movies. This finding implies that Korean moviegoers are influenced by the variety and quality of imported movies but not domestic movies. The greater addictiveness of imported movies helps to explain why the Korean movie industry has been so vocal in opposing the removal of the screen quota system which has protected it from foreign competition.

4 Concluding Remarks

There are intuitively plausible grounds for suspecting that a substantial part of cinema demand may be driven by addiction or habit. For example, many sequels or re-makes of commercially successful movies are also commercially successful. Moviegoers often develop strong preferences for certain actors or directors over time and subsequently go to other movies featuring their preferred actors or directors. They also sometimes develop preferences for certain movie genres – e.g. romantic comedy or action – based partly on past experience. At a broader level, the whole movie-going experience may be thought of

[9] See, for example, Gapinsky (1976), Throsby (1990) and Heilbrun and Gray (1993).
[10] On the other hand, as we discussed earlier, a number of studies found higher demand elasticity of cinema demand with respect to own price and income.

as an entertainment habit formed through years of experience. In light of the above rationales for the importance of addiction or habit in cinema demand, it is surprising that our review of the existing literature yields only one empirical study of the issue – Cameron (1999). As such, the main contribution of our study is to contribute some evidence to the almost non-existent empirical literature on addictive cinema demand.

More specifically, we used Korean time-series data from 1963 to 2004 to estimate models for addictive behavior in the demand for cinema services. Our estimation results strongly support the presence of addictive behavior exists in Korean cinema demand under both myopic addiction and rational addiction. Therefore, not only is Korean cinema demand addictive, but the addictiveness is rational. We also find that cinema demand is relatively unresponsive to the admission price and unrelated to income, a result which is consistent with habit or addiction important determinants of cinema demand. That is, our results suggest that Korean consumers' decision to go to movies may be more driven by habit or addiction rather than more typical demand factors such as own price or income. Furthermore, our results imply that among Korean consumers, addictiveness is stronger for imported movies than domestic movies. Finally, an additional interesting result is that an increase in the variety of movies has a positive impact on cinema attendance. Consumers are more likely to go to cinemas when they face a larger selection of movies in light of the diversity of consumer preferences with respect to movies.

Our results have some implications for the marketing strategies of the movie industry. Having a better understanding of habit or addictiveness in cinema demand can help the movie industry design more effective marketing strategies. For instance, discounted ticket prices for children and teenagers will generate less revenue for the industry in the short

term if cinema demand is inelastic, but the strategy may be profitable in the long run if early and inexpensive exposure to movies induces young customers become regular movie-goers in the future.[11] If certain types of movies are more addictive than others, this will increase the demand and hence production of such movies in the long run. Addictiveness of cinema demand can have effects far beyond the profitability or output mix of the movie industry. Movies containing gratuitous sex or violence are believed to have an undesirable influence on young and impressionable moviegoers. If such movies are addictive, then there is all the more cause for concern. We hope that our study will motivate researchers to empirically examine whether cinema demand in other countries is also characterized by addictive behavior. It would also be interesting to see whether our finding that imported movies are more addictive than domestic ones can be replicated for other countries. Greater addictiveness of imported movies, in particular Hollywood movies, may be a contributing factor behind cultural nationalism and protectionism.

[11] However, the optimal strategy for each cinema may not be to offer the price discounts *independently* since this could give rise to free-riding problems. What is required to make such discounts more effective is either government regulations or industry-wide agreements.

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Table 1
Variable Abbreviations, Descriptions and Data Sources

Variable	Abbreviation	Description	Data Source
Per capita attendance	*Attr*	Total attendance/population	Cinema Yearbook
Admission price	*P*	Average admission price	Cinema Yearbook
Income	*Y*	Per capita GDP	KOSIS
Admission price for cultural facility	P_c	Average admission price for cultural facilities	KOSIS
Substitutes price	*CPI*	CPI for leisure and entertainment services	KOSIS
Number of screens	*Scn*	Number of screens	Provided by cinemas
Number of Korean movies	Q_k	Number of domestic Movies Produced	The Yearbook
Number of movie exports	X_k	Number of Korean movie exports	Cinema Yearbook, Handbook of Korean Cinema
Unit export price	P_x	Average export price of Korean movies	Cinema Yearbook, Handbook of Korean Cinema
Number of movie Imports	M_f	Number of foreign imports rated by the government	Cinema Yearbook, Handbook of Korean Cinema
Unit import price	P_m	Average import price of foreign movies	Cinema Yearbook, Handbook of Korean Cinema
TV sets	*TV*	TV sets registered	KBS, 1963-2004
Cable availability	*Dcab*	Introduction of cable TV	Before 1995=0, After 1995=1

Notes: Data period is 1961-2004 unless stated otherwise. KOSIS and KBS denote Korea Statistical Information System and Korea Broadcasting System, respectively.

Table 2
Unit Root Tests of the Variables

Variables	ADF		Phillips-Perron		KPSS	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
Log(*Attr*)	-1.670	-3.280**	-1.185	-3.200**	0.508**	0.217
Log(*P*)	-1.427	-3.463**	-1.394	-6.255*	0.798*	0.177
Log(*Y*)	-0.574	-5.801*	-0.564	-5.794*	0.837*	0.138
Log(P_c)	-3.381**	-4.118*	-3.090**	-4.129*	0.817*	0.559**
Log(*CPI*)	-2.591	-2.815***	-2.835***	-2.949**	0.780*	0.497
Log(*Scn*)	-1.002	-2.080	-1.524	-2.026	0.436***	0.132
Log(Q_k)	-1.680	-7.612*	-1.719	-7.649*	0.608**	0.122
Log(X_{jk})	-2.657***	-6.089*	-2.779**	-8.914*	0.156	0.173
Log(P_x)	-1.988	-9.986*	-1.638	-14.18*	0.792*	0.350***
Log(M_f)	-1.011	-4.244*	-0.852	-4.244	0.502**	0.205
Log(P_m)	-2.130	-7.663*	-1.961	-7.753*	0.439***	0.073
Log(*TV*)	-4.155*	-2.595	-3.081**	-2.647***	0.688**	0.450***

Notes: Test regressions contain a constant and a linear time trend, and lags of the dependent variable are chosen by AIC and SC. *, ** and *** reject the null hypothesis at the 1, 5, and 10% significance level, respectively. The null hypothesis is the existence of unit root for ADF and PP tests, and the non existence of unit root for KPSS test.

Table 3
Johansen's Log Likelihood Test for Cointegration

Log(*Attr*), Log(*P*), Log(*Y*)					
H_0 : rank=r	Eigenvalue	Max-Eigenstat	5 % Critical	Trace stat.	5 % Critical
None	0.219	10.43	21.13	13.51	27.79
r≤1	0.054	2.334	14.26	3.081	15.49

Notes: Test regression includes a constant and a linear deterministic trend in the data. The test indicates 1 cointegrating equation at the 5% significance level for each set of the variables.

Table 4
Coefficient Estimates of Korean Cinema Demand (Dependent variable: $\Delta log(Attr)_t$

Explanatory Variable	OLS			
	(i)	(ii)	(iii)	(iv)
Constant	0.019 (0.035)	0.039 (0.035)	0.059 (0.040)	-0.004 (0.048)
$\Delta log(P)_{t-1}$	-0.438* (0.175)	-0.390** (0.170)	-0.241 (0.156)	-0.217 (0.148)
$\Delta log(Y)_{t-1}$	-0.234 (0.559)	-0.140 (0.534)	-0.660 (0.504)	-0.313 (0.502)
$\Delta log(Q_k)_t$	0.256* (0.097)	0.246* (0.092)	0.200** (0.083)	0.175** (0.080)
$\Delta log(M_f)_{t-1}$	0.143*** (0.078)	0.144*** (0.075)	0.139** (0.071)	0.174* (0.069)
$\Delta log(P_x)_t$	0.037 (0.026)	0.044*** (0.025)	0.032 (0.023)	0.022 (0.022)
$\Delta log(P_m)_{t-1}$	0.108*** (0.055)	0.132** (0.054)	0.132* (0.048)	0.108** (0.047)
$\Delta log(TV)$		-0.190** (0.090)	-0.126 (0.083)	-0.082 (0.081)
$\Delta log(P_c)_{t-1}$			0.577** (0.266)	0.589** (0.251)
$\Delta log(CPI)_{t-1}$			-0.722* (0.222)	-0.549** (0.224)
Dcab				0.097** (0.044)
$\bar{R}^2$	0.187	0.262	0.417	0.479
D.W.	1.224	1.278	1.242	1.227

Notes: Standard errors are in parentheses. *, ** and *** are statistically significant at the 1, 5 and 10% significance level, respectively.

Table 5
Coefficient Estimates of Myopic Models of Addiction for Korean Cinema Demand
(Dependent variable: $\Delta log(Attr)_t$

Explanatory Variable	OLS	2SLS		
		(i)	(ii)	(iii)
$\Delta log(Attr)_{t-1}$	0.471* (0.099)	0.368** (0.180)	0.431* (0.169)	0.342** (0.156)
Constant	-0.039 (0.043)	-0.039 (0.042)	-0.042 (0.041)	-0.037 (0.041)
$\Delta log(P)_{t-1}$	-0.099 (0.113)	-0.096 (0.129)	-0.086 (0.128)	-0.026 (0.145)
$\Delta log(Y)_{t-1}$	-0.236 (0.412)	-0.202 (0.422)	-0.202 (0.421)	-0.278 (0.429)
$\Delta log(Q_k)_t$	0.089 (0.080)	0.107 (0.074)	0.096 (0.073)	0.080 (0.076)
$\Delta log(M_f)_{t-1}$	0.191* (0.055)	0.197* (0.058)	0.197* (0.058)	0.202* (0.058)
$\Delta log(P_x)_t$	-0.004 (0.014)	-0.001 (0.020)	-0.004 (0.020)	-0.008 (0.021)
$\Delta log(P_m)_{t-1}$	0.067** (0.032)	0.095*** (0.050)	0.086*** (0.050)	0.088*** (0.021)
$\Delta log(TV)$	-0.062*** (0.037)	-0.055 (0.068)	-0.054 (0.068)	-0.028 (0.073)
$\Delta log(P_c)_{t-1}$	0.805* (0.145)	0.736* (0.231)	0.769* (0.228)	0.697* (0.229)
$\Delta log(CPI)_{t-1}$	-0.431* (0.165)	-0.474** (0.195)	-0.454** (0.194)	-0.546* (0.206)
Dcab	0.076** (0.039)	0.089** (0.039)	0.084** (0.039)	0.100** (0.040)
$\bar{R}^2$	0.643	0.644	0.645	0.642
D.W.	2.033	1.905	2.000	1.935
Hausman t-statistic		0.392 (0.347)	-0.157 (0.562)	0.974 (0.165)

Notes: The instruments used in Model (i) consist of all exogenous variables in the model plus one-period lag of them. Model (ii) adds the number of screens, $\Delta \log(Scn)_{t-1}$ and one-period lag of it, $\Delta \log(Scn)_{t-2}$, and Model (iii) further adds additional two more lagged variables of admission price, $\Delta \log(P)_t$ and the number of screens. Refer to the previous notes for other specifications.

Table 6
Coefficient Estimates of Rational Models of Addiction for Korean Cinema Demand
(Dependent Variable: $\Delta log(Attr)_t$

Explanatory Variable	OLS	2SLS		
		(i)	(ii)	(iii)
$\Delta log(Attr)_{t+1}$	0.275* (0.087)	0.376* (0.145)	0.373* (0.144)	0.353** (0.146)
$\Delta log(Attr)_{t-1}$	0.419* (0.104)	0.446* (0.159)	0.447* (0.153)	0.481* (0.154)
Constant	-0.025 (0.042)	-0.028 (0.041)	-0.028 (0.041)	-0.031 (0.042)
$\Delta log(P)_{t-1}$	-0.016 (0.126)	0.041 (0.135)	0.040 (0.135)	0.041 (0.137)
$\Delta log(Y)_{t-1}$	-0.282 (0.399)	-0.261 (0.417)	-0.261 (0.417)	-0.267 (0.426)
$\Delta log(Q_k)_t$	0.072 (0.092)	0.056 (0.072)	0.056 (0.072)	0.051 (0.073)
$\Delta log(M_f)_{t-1}$	0.163* (0.051)	0.159* (0.059)	0.160* (0.059)	0.166* (0.061)
$\Delta log(P_x)_t$	-0.007 (0.014)	-0.013 (0.020)	-0.013 (0.020)	-0.015 (0.020)
$\Delta log(P_m)_{t-1}$	0.079* (0.028)	0.089*** (0.049)	0.088*** (0.048)	0.081 (0.050)
$\Delta log(TV)$	-0.030 (0.030)	-0.011 (0.069)	-0.011 (0.069)	-0.012 (0.071)
$\Delta log(P_c)_{t-1}$	0.702* (0.154)	0.675* (0.228)	0.676* (0.227)	0.712* (0.234)
$\Delta log(CPI)_{t-1}$	-0.431* (0.151)	-0.428** (0.190)	-0.428** (0.190)	-0.420** (0.194)
Dcab	0.039 (0.039)	0.027 (0.044)	0.027 (0.044)	0.025 (0.046)
$\bar{R}^2$	0.667	0.657	0.657	0.642
D.W.	2.507	2.687	2.685	1.948
Wu F-ratio		4.159** (0.035)	4.975** (0.020)	6.994* (0.004)

Notes: The instruments used in 2SLS models are identical to those in the myopic addictive demand models. The only difference is that we added one-year leads of all the exogenous variables as additional instruments. Refer to the notes in Table 4 for other specifications.