The Economics behind Free Tickets in Korean Movie Industry[*]

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This paper explores the welfare effects of free tickets on the Korean movie industry by employing a simple profit maximization model of a movie exhibitor.   The paper argues that recent debate on free tickets comes from the misalignment of incentives between an exhibitor and a distributor created through the movie exhibition contract.   From the social point of view, it is shown that efficiency gains in the theatrical market are expected from the free tickets in spite of the possible harmful effect on the profits of the distributor.

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1. INTRODUCTION

In relation to the recent boom in the Korean movie industry, one of the most distinguished phenomena is the predominance of three major companies over the movie markets.[1] All the three majors including CJ Entertainment, Showbox, and Lotte are characterized by a vertically integrated structure as they integrate all the successive stages in the industry from investment to theatrical exhibition. The dominance of majors is especially remarkable at the theatrical stage. The cinemas affiliated with the majors (including CGV, Premus, Megabox, and Lotte Cinema) are occupying a significant market share by operating nationwide multiplex chains. As of 2006, the four multiplex chains own 54.7% of the overall screens and the aggregate market share is 70.1% of nationwide admissions.

While the vertically integrated majors are often considered to contribute to the recent boom in the industry (Jwa and Lee, 2006; Kim, 2004), there also have been criticisms on the harmful effects of the dominance based on both economic and non-economic considerations. For example, it was argued that the majors discriminate against the unaffiliated rivals and discourage the diversity in both film production and exhibition (Nam, 2004; Kang, 2004). A series of recent reports released from the Korea Fair Trade Commission (KFTC) show that the KFTC also worries about the strengthening of the market power by the majors.

The movie industry consists of four successive stages including production, distribution, exhibition, and ancillary markets. Once a movie has been produced, it must be distributed to cinemas for exhibition. In order to release a movie to a cinema, a distributor needs to contract with an exhibitor or several exhibitors using revenue sharing contracts. The issues related to the contracts between distributors and exhibitors provide both academic and non-academic areas with the main sources of debate for the movie industry

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[1] During the last decade, Korea has observed the emergence of a renaissance in the movie industry. Both nationwide admissions and box office revenues have showed rapid growth, the number of locally produced movies has increased yearly, and the market share of domestic movies has exceeded fifty percent, which are all rare in the global movie market.

(Corts, 2001; Hanssen, 2002; Fu, 2004; Filson, *et al*, 2005; Gil and Lafontaine, 2007; Gil, 2007; 2008).

In the Korean case, even greater importance is given to the relationship between distributors and exhibitors due to the dominance of the vertically integrated multiplex cinema chains in the nationwide theatrical market. In this aspect, the recent uncovering by the KFTC of the major cinemas abuse of market power is considered an important yardstick of the unfavorable effects of the market dominance of the majors. The uncovering includes the unfair trade conduct of cinemas such as the unilateral issuing of free tickets, discriminating against non-integrated rivals such as unfair screen assignment, early ending of movie screening, and forcing distributors to accept a disadvantageous revenue sharing rule (KFTC, Jan. 2008).

Despite the ongoing debates on the market power of the major cinemas, it is unfortunate that little evidence on the potential unfavorable effect of the major on the market performance has been provided for the Korean movie industry. [2] Instead, the unproven argument against the majors is led by non-academic interested parties, such as the movie reviewers and the unaffiliated rivals in the industry.

This paper examines one of the current issues in the theatrical market that would be raised by the dominance of major cinemas: the issue of free tickets. The paper analyzes the economic effects of the issuing of unilateral free tickets by exhibitors through the investigation of the effect on the performance of the theatrical market. According to the Korea Film Council (KFC), the proportion of free audience members to the aggregate admission of the four major multiplex chains has gradually increased each year. [3]

Together with the open debate on movie run length, the debate on free tickets is another issue that comes from the misalignment of incentives between distributors and exhibitors. In the theatrical market, exhibitors not

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[2] A couple of empirical studies investigate the issues such as integrated foreclosure by exhibitors on unaffiliated distributors, run length preference for the movies of affiliated distributors, and diversity of movies (Choi, 2006; Choi, Lee and Choe, 2008).

[3] The proportions of free audience members were 1.95% in 2005 and 2.16% in 2006. It increased to 2.49% at the end of July 2007.

only share the revenue from ticket sales with distributors but also keep the total revenues from concession sales. The first issue that comes from the misalignment of incentives is that of movie run length, as studied by Gil (2008). Exhibitors always welcome a new release to maximize revenues since the ticket sales of a movie generally decrease with the run length. Gil's (2008) empirical study shows that the vertical integration of a distributor with an exhibitor is a device to eliminate the distortion on movie run length.

There is also the other issue of free tickets. An exhibitor raises revenues not only from ticket sales but also from concession sales. Movie tickets and concession sales items can be considered close complements since most of movie audiences purchase popcorn and soft drinks. An exhibitor has an incentive to enlarge the number of visitors to the cinema to raise revenues not only from ticket sales but also from concession sales. In this aspect, issuing free tickets is a good strategy for an exhibitor to enlarge the number of cinema visitors. One can expect that an exhibitor has a stronger incentive to issue free tickets for the movie with a lower box-office performance. Otherwise, they would try to stop the screening of the movie to release a new movie to minimize opportunity cost. In addition, an exhibitor would have a stronger incentive to issue free tickets when it expects higher revenues from the concession sales. Free tickets are thought to be a strategy to raise revenue for the part of an exhibitor. However, this strategy seems disadvantageous to a distributor because parts of an audience who are willing to pay for the movie are turned into free audience members that lower the share of box office revenue earned by the distributor.

The unilateral issuing of free tickets by exhibitors can be criticized for the abuse of market power by major cinemas. A social point of view requires the examination of the potential loss or gain in efficiency in order to evaluate the welfare effect of free tickets. This study investigated the effects of free tickets on the profits of both exhibitor and distributor using a simple profit maximization model of the movie exhibitor. It also considered the consumer surplus of the movie-goers in order to evaluate the effect of free

tickets on the performance of theatrical markets.

The study finds that the profit of an exhibitor with the free tickets depends on the proportion of free audience members who would willingly pay for tickets to the total number of free audience members. The exhibitor has a greater incentive to issue free tickets when it expects that a smaller number of free audience members are those who would not pay the ticket price without free tickets. This implies that the exhibitor attempts to reduce the proportion of the free audience with a higher willingness to pay the ticket price to minimize the box office revenue loss. The study also finds that the exhibitor has less incentive to issue free tickets for a movie with a higher box office power. The profit of the distributor is decreased by the issue of free ticket except for the case when all free audience members are those who would not be paid audience members. The consumer surplus of movie audience members appeared to increase with free tickets because the total number of audience members is increased by free tickets. As a result, social welfare is increased by the free tickets because the increase in the profit of the exhibitor and consumer surplus dominates the decrease in the profits of the distributor. This paper shows that potential gains in efficiency of economic outcomes in the theatrical market are expected from the free tickets.

There are other implications for the Korean movie industry. As the incentives of an exhibitor to issue free tickets become higher, a distributor needs to pay higher costs to monitor the unilateral issuing of free tickets by an exhibitor. In this case, vertical integration would be a solution to the incentive misalignment problem. The problem caused by free tickets on the part of distributors can be solved by the joint profit maximization of vertically integrated firms. Results show that free tickets are related to the recent appearance of luxury cinemas with affiliated facilities such as restaurants, entertainment rooms, and gift shops. Since the profit of an exhibitor depends on the revenues from affiliated facilities for the luxury cinemas, they try to enlarge the number of visitors by issuing free tickets.

The reminder of this paper is organized as follows. Section 2 sets up a simple economic model of a profit maximization model for an exhibitor with

and without free tickets.   Section 3 analyzes the effects of free tickets on the profits of both exhibitor and distributor and consumer surplus.   Section 4 concludes the paper with a summary of findings.

2. MODEL

This section presents a profit maximization model for a monopolistic movie exhibitor to understand the mechanism behind free tickets.   The study assumes a linear market demand for a movie.   An exhibitor has two sources of revenue: box office revenues and revenues from the concession sales.   In the theatrical market, an exhibitor and a distributor share box office revenues.   Normally, the share contract between them sets a 50-50 split for local movies and a 40-60 split for foreign movies in the Korean movie industry.[4]

In addition to the share from box office revenue, the exhibitor keeps the total receipts from concession sales.   The concession sales include not only the sales of popcorn and beverages but also the sales of all other attached facilities to the cinema such as restaurants, entertainment rooms, and gift shops.   To simplify the analysis it was assumed that each audience purchases one unit of concession sales items at a given price, i.e., each audience purchases a movie ticket and one unit of concession sales item as a bundled good.[5]

2.1. An Exhibitor's Problem without Free Tickets

Let the ticket price and the concession sales price be P_T and P_C,

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[4] The revenue sharing contract between a distributor and an exhibitor specifies the weekly share of box office revenue that the distributor gets. Different from the Korean case, the revenue sharing mechanism in the international movie industry usually follows the so-called sliding scale scheme where the share for the distributor declines over time.

[5] The analysis is greatly simplified by employing this harmless assumption because the study is free from the consideration on the effect of free tickets on concession price, which is denoted by P_C in the analysis.

respectively, and the market demand for a movie be Q_T.   Then the inverse demand function for a movie is given by

$$P_T = a - P_C - bQ_T, \qquad (1)$$

where $a > P_C > 0$ and $b > 0$.   Note that the demand for a movie decreases with the given concession sales price because each audience member is assumed to purchase one unit of concession sales items.

It is assumed that the marginal cost of screening a movie for an additional audience is zero if the total number of audience members is smaller than the capacity constraint of the cinema.   On the contrary, the marginal cost of concession sales to an additional customer, denoted by $c(>0)$ is assumed constant.

According to the revenue sharing rule, an exhibitor obtains half of the total box office revenue.   When an exhibitor does not issue free tickets for a movie, the problem for screening a movie becomes

$$\max_{Q_T} \quad \pi^M = \frac{1}{2} P_T Q_T + (P_C - c) Q_T, \qquad (2)$$

where the first and second term in the right hand side represent the profits from ticket sales and concession sales.   Obtained from the first order condition of the problem is

$$Q_T^M = \frac{1}{2b}\left(a + P_C - 2c\right), \quad a + P_C - 2c > 0, \qquad (3)$$

$$P_T^M = \frac{1}{2}\left(a - 3P_C + 2c\right), \quad a - 3P_C + 2c > 0, \qquad (4)$$

where Q_T^M and P_T^M are the profit maximizing quantity of the exhibitor for

ticket sales and ticket price,[6] respectively.[7]   Substituting equation (3) and (4) into the profit function gives

$$\pi^M = \frac{1}{8b}\left(a + P_C - 2c\right)^2,$$ (5)

as the monopolistic profit of the exhibitor.

It is helpful to identify the relationship between the ticket price and marginal revenue to explain the effects of a change in concession sales price on the monopolistic equilibrium.   The revenue of the exhibitor consists of ticket sales revenue and concession sales revenue

$$R = R_T + R_C,$$

where R_T and R_C denote the former and the latter.   Then the marginal revenue from additional ticket sales is expressed by

$$\begin{aligned} MR &= MR_T + MR_C \\ &= \frac{1}{2}\left(a - P_C - 2bQ_T\right) + P_C. \end{aligned}$$ (6)

Note that the marginal revenue from additional ticket sales, MR_T, has the same slope as the demand curve with half the intercept.   This implies that MR_T is less than the ticket price P_T.   However, the marginal revenue from additional concession sales, MR_C, is equal to P_C since an additional ticket sale implies an additional concession sale.   The demand function in equation (1) and the marginal revenue in equation (6) have the same slopes

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[6] The second order sufficient condition is satisfied.

[7] In many cases, the producer of a movie also distributes the movie to exhibitors.   The distributor obtains a share of the box office revenue and ancillary market revenue, while it pays both for the production and marketing costs of the movie.   This paper, assumes that the profit of the distributor is half of the box office revenue to concentrate on the behavior of the exhibitor.   The profits of the distributor is calculated by $\pi^{Dist} = P_T^M Q_T^M / 2$.

**Figure 1 The Relationship between Demand Curve and
Marginal Revenue**
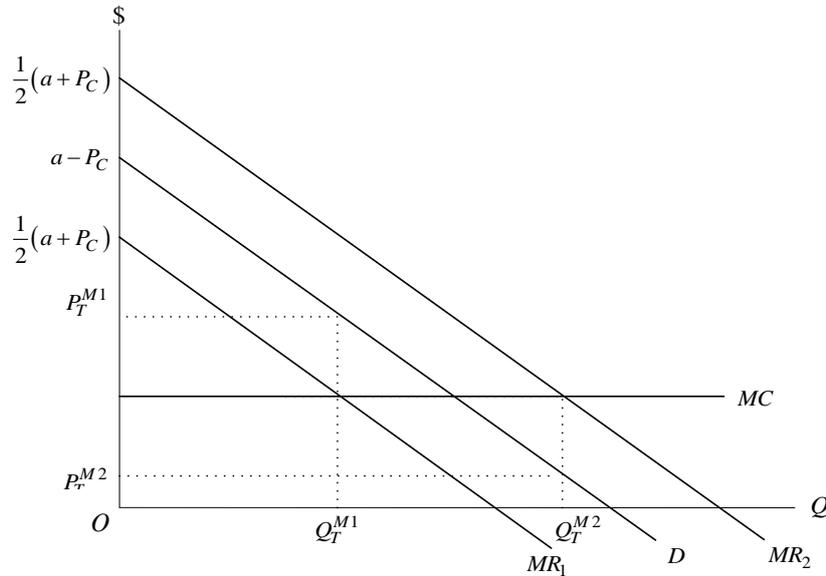
with different intercepts.　Since the relative height of the intercepts is determined by the concession sales price P_C , we can consider two possibilities as it is depicted in figure 1.　When the intercept of the inverse demand curve is greater (smaller) than that of the marginal revenue curve, the ticket price is given by P_T^{M1} (P_T^{M2}).

　The effects of a change in concession price on the monopolistic equilibrium are now examined.　Equations (3) and (4) show that an increase in the concession sales price decreases the ticket price while it also increases the quantity of ticket sales.　The profit of the exhibitor then increases with an increase in the concession sales price

$$\frac{\partial \pi^M}{\partial P_C} = \frac{1}{4b}(a + P_C - 2c) > 0.$$

　As depicted in figure 2, the inverse demand curve shifts downward while

Figure 2   The Effect of an Increase in Concession Sales Price ($P_C^1 < P_C^2$)
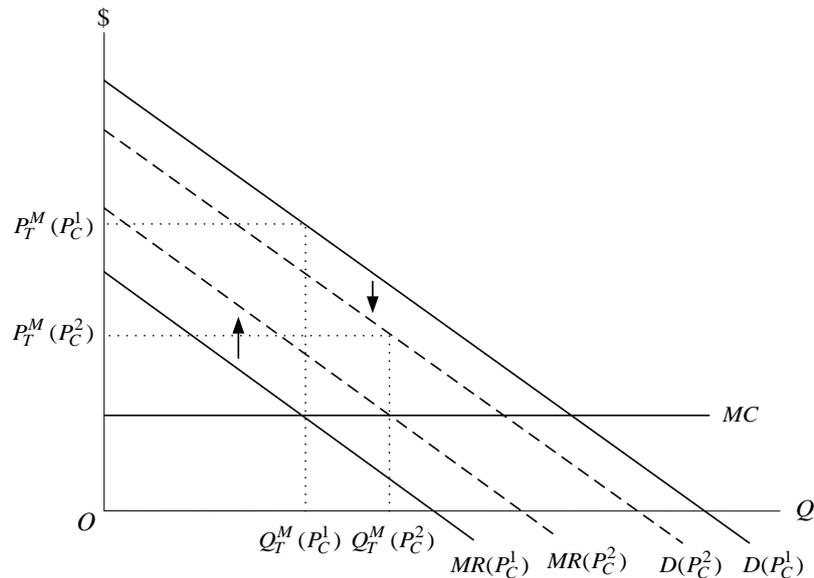
the marginal revenue curve shifts upward with an increase in the concession sales price from P_C^1 to P_C^2 .[8]   As a result, the equilibrium price of ticket is lowered while the equilibrium quantity of ticket sales is increased.   The decrease in the ticket price increases the ticket sales quantity as well as the concession sales quantity.   The profit of an exhibitor increases with an increase in the concession sales price.

2.2. An Exhibitor's Problem with Free Tickets

Now suppose that the exhibitor issues free tickets for the movie it shows. An audience member with a free ticket can enjoy a free movie, but must pay for the purchase of concession sales.   Let Q_{PT} and F be the numbers of paid audience members and free audience members.   Note that the exhibitor can issue free tickets when the number of paid audience members is expected

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[8] Figure 2 considers the case when the intercept of inverse demand curve is greater than that of the marginal revenue curve in figure 1.

to be smaller than the capacity limit $\overline{Q}$.   It is assumed that this condition holds so that the exhibitor is able to issue free tickets, i.e., $Q_{PT} < \overline{Q}$.   The maximum number of free tickets issued by the exhibitor is the difference between the capacity limit of the cinema and the number of paid audience members, $F^{\max} = \overline{Q} - Q_{PT}$.   The exhibitor decides the number of free ticket issued with the consideration of the effect of free tickets on the profit.

It is important to note that the free audience members are classified by two types depending on the willingness to pay for the movie when they do not have free tickets: those who would be paid audience members and those who would not go to the cinema because the willingness to pay is lower than the ticket price.   Let the proportion of the former type of free audience members to the total number of free audience members be α where $0 \leq \alpha \leq 1$.[9] Then the total number of audience members whose willingness to pay for the ticket is higher than the ticket price is denoted by

$$Q_T = Q_{PT} + \alpha F. \tag{7}$$

Thus, αF represents the number of free audience members who would purchase tickets if they did not have free tickets.

Since the inverse demand function in equation (1) is changed to

$$P_{PT} = a - P_C - b(Q_{PT} + \alpha F), \tag{8}$$

with free tickets, the problem of the exhibitor becomes

$$\max_{Q_{PT}} \ \pi_{PT} = \frac{1}{2}\left[a - P_C - b(Q_{PT} + \alpha F)\right]Q_{PT} + \left(P_C - c\right)\left(Q_{PT} + F\right). \tag{9}$$

Note that the profit from concession sales increases by the number of free

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[9] When α equals to zero, all free audience members are those who would not be paid audience members. On the contrary, when α equals to 1, all the free audience members are those who would be paid audience members if they did not have free tickets.

audience members, F, as it is shown in the second term of the right hand side of equation (9).

Obtained from the first order condition of the problem is

$$Q_{PT}^M = \frac{1}{2b}\left(a + P_C - 2c - b\alpha F\right), \quad a + P_C - 2c > b\alpha F, \tag{10}$$

and

$$P_{PT}^M = \frac{1}{2}\left(a - 3P_C + 2c - b\alpha F\right), \quad a - 3P_C + 2c > b\alpha F, \tag{11}$$

where Q_{PT}^M and P_{PT}^M are the profit maximizing quantity of the exhibitor on ticket sales and ticket price, when it issues free tickets.[10] Substituting equations (10) and (11) into the profit function yields

$$\pi_{PT}^M = \frac{1}{8b}\left(a + P_C - 2c - b\alpha F\right)^2 + (\; P_C\;)c \tag{12}$$

as the monopolistic profit of the exhibitor with free tickets.[11]

The exhibitor decides the number of free tickets issued by examining the effect of free tickets on the monopolistic profit appeared in equation (12). Differentiating π_{PT}^M with respect to F and setting the value to zero gives

$$F^* = \frac{1}{b\alpha}\left[(a + P_C - 2c) - \frac{4}{\alpha}(P_C - c)\right] \gtreqless 0, \tag{13}$$

where F^* is the number of free tickets at which the value of π_{PT}^M is minimized.[12] The value of π_{PT}^M at $F = 0$ is calculated by

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[10] The second order sufficient condition is satisfied.

[11] It is apparent that that the profit of the distributor decreases with the issue of free tickets because some audience members who would willingly pay for tickets turn into free audience members. The profit of the distributor is calculated by $\pi_{PT}^{Dist} = P_{PT}^M Q_{PT}^M / 2$.

[12] Note that the second derivative of π_{PT}^M with respect to F is given by $\partial^2 \pi_{PT}^M / \partial F^2 =$

Figure 3   The Relationship Between π_{PT}^{M} and F

Case 1) $\alpha \to 0$ Case 2) $\alpha = 1$
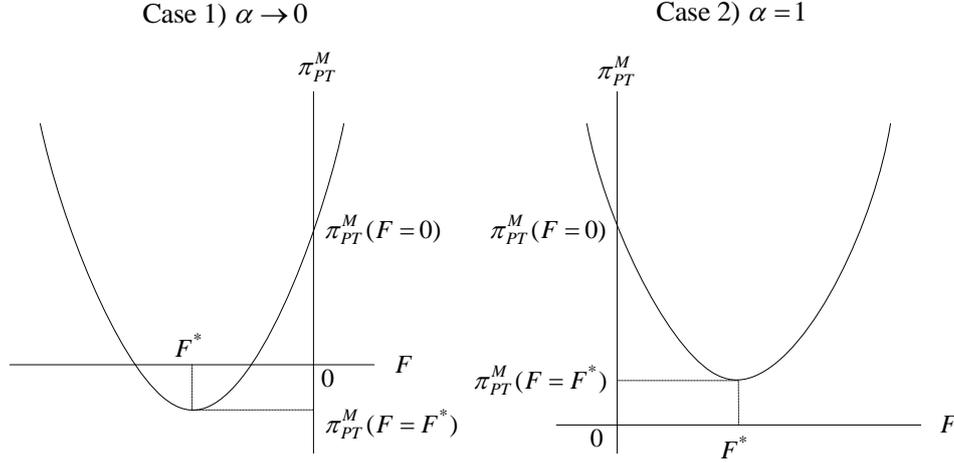
$$\pi_{PT}^{M}(F=0) = \frac{1}{8b}(a + P_C - 2c) > 0. \tag{14}$$

From equations (13) and (14), it is known that π_{PT}^{M} is a convex function of F with a positive intercept.   Case 1 and Case 2 in figure 3 depict the relationship between π_{PT}^{M} and F for the cases when α is close to zero and $\alpha = 1$.   In Case 1, it is apparent that the profit maximizing number of free tickets is $F^{\max}$ because $\partial \pi_{PT}^{M}/\partial F > 0$ for all $F \geq 0$.   In Case 2, the exhibitor will not issue free ticket if $F^{\max}$ is smaller than F^{*} because $\partial \pi_{PT}^{M}/\partial F < 0$ for all $F \leq F^{\max} < F^{*}$.   Even if $F^{\max}$ is greater than F^{*}, the exhibitor will not issue free tickets because all the free audience members would be paid audience members without free tickets, and the profit of the exhibitor will decreases by issuing free tickets.

Unfortunately, it is not possible identify a monotonic relationship between F^{*} and α.   However, since the value of π_{PT}^{M} evaluated at $F = 0$ is always positive and does not depend on α, it is obvious that either Case 1 or Case 2 is relevant for most of the values of α.   The relationship between

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$b\alpha^2/4 > 0$ for all $\alpha > 0$.

monopolistic profit and the number of free tickets as described above is summarized in Proposition 1.

Proposition 1: *The number of free tickets issued by the monopolistic exhibitor is either zero or* $F^{\max}$ *, depending on the value of* α *.*[13]

Proposition 1 is interpreted as follows.　The decision by the exhibitor on the number of free tickets depends on the expectation on the value of α. If the exhibitor considers that most of the free audience members are those who would not go to the cinema when they do not have free tickets, it will issue as many free tickets as possible because the revenue from concession sales is increased by the number of free audience members with little revenue loss from ticket sales.　On the contrary, if the exhibitor considers that most of the free audience members are those who would be paid audience members, the exhibitor will be needed to compare the gain from the increase in concession sales with the loss from the decrease ticket sales.　Given the number of paid audience members, the decision by the exhibitor on the number of free tickets is either zero or $F^{\max}$ depending on the number of vacant seats in the cinema.

Equations (10) and (11) show that increases in the concession sales price increases the quantity of ticket sales while it decreases the ticket price.　The effect of a change in the concession sales price on the profit of an exhibitor is obtained by

$$\frac{\partial \pi_{PT}^{M}}{\partial P_C} = \frac{1}{4b}(a + P_C - 2c - b\alpha F) + F > 0 \tag{15}$$

An increase in the concession price increases the profit of an exhibitor when the exhibitor issues free tickets.

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[13] It is apparent that the result in Proposition 1 will not be affected even if the value of π_{PT}^{M} at F^{*} is negative for some values of α for Case 2 in figure 3.

Both ticket price and ticket sales quantity decrease with an increase in the quantity of free tickets. In addition, both ticket price and ticket sales quantity decrease with an increase in the value of α. The effects of changes in α on the profit is obtained by

$$\frac{\partial \pi_{PT}^M}{\partial \alpha} = -\frac{F}{4}(a + P_C - 2c - b\alpha F) < 0. \tag{16}$$

Given the number of free audience members, the effect of an increase in the proportion of free audience members who would be willing to pay for the ticket price affects the profit negatively because it decreases box office revenue without affecting the quantity of concession sales.

3. THE WELFARE EFFECT OF FREE TICKETS

It is important to solve the effect of free ticket on the profits of exhibitors and distributors, consumer surplus, and social welfare in order to investigate the welfare effect of free tickets. Through this process, it is possible to obtain important implications on current issues in the Korean movie industry.

The effect of free tickets on the ticket price of the exhibitor and ticket sales can be identified by comparing ticket prices and ticket sales quantities with and without the free tickets. Let Δ_P be the difference between the ticket price with and without free tickets, i.e., $\Delta_P = P_{PT}^M - P^M$ and Δ_Q be the difference between the ticket sales quantity with and without free tickets, $\Delta_Q = Q_{PT}^M - Q^M$. Then it is easy to obtain

$$\Delta_P = -\frac{\alpha b}{2} F, \quad \text{and} \quad \Delta_Q = -\frac{\alpha}{2} F.$$

Note that $\Delta_P = \Delta_Q = 0$ for $\alpha = 0$ and both $\Delta_P < 0$ and $\Delta_Q < 0$ for all $\alpha > 0$. Both the optimum ticket price and quantity with free tickets for the

exhibitor are smaller than those without free tickets except for the case when all the free audience members would not be willing to pay the ticket price. From these results, it is apparent that the exhibitor has an incentive to issue free tickets only when it has other revenue sources to raise profits. In addition, the ratio of free audience members with a willingness to pay for the ticket plays an important role for the decision by the exhibitor on the issuing of free tickets because both Δ_P and Δ_Q are negatively related to the value of α.

The effect of free tickets on the profit of the exhibitor is obtained by comparing the monopolistic profits with and without free tickets. Let Δ_π be the difference between the profit of the exhibitor with and without free tickets $\Delta_\pi = \pi_{PT}^M - \pi^M$. Then Δ_π is calculated by

$$\Delta_\pi = \frac{1}{8}\alpha F\left[\alpha bF - 2(a + P_C - 2c)\right] + (P_C - c)F. \tag{17}$$

The proportion of free audience members who would be willing to pay for the ticket price to the total number of free audience members is important for the exhibitor. The result on the relationship between Δ_π and α is summarized in Proposition 2.
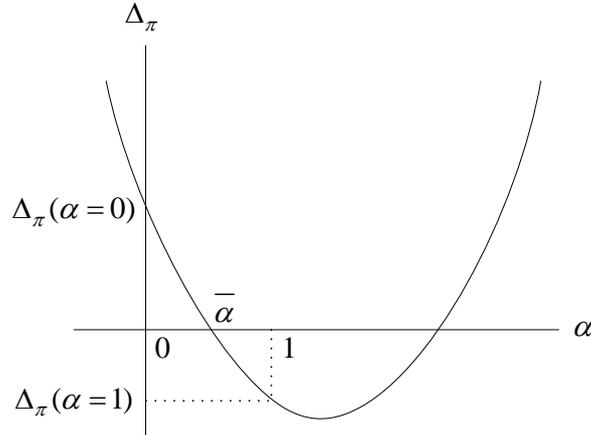
Proposition 2: *There exists a value $\bar{\alpha}$ for $0 < \alpha < 1$ such that $\Delta_\pi \gtreqless 0$ if and only if $\alpha \lesseqgtr \bar{\alpha}$.*

Proof: Differentiating equation (15) with respect to α gives

$$\alpha^* = \frac{1}{bF}(a + P_C - 2c) > 0,$$

where α^* is the value of α at which Δ_π is minimum. In addition, the values of Δ_π evaluated at $\alpha = 0$ and $\alpha = 1$ are given by

$$\Delta_\pi(\alpha = 0) = (P_C - c)F > 0 \quad \text{and}$$

Figure 4   The Relationship between Δ_π and α

$$\Delta_\pi(\alpha=1) = bF - 2(a - 3P_C + 2c) < 0 .$$ Q.E.D.

It is helpful to use figure 4 to explain Proposition 2 in detail. Note that $\Delta_\pi(\alpha=0)$ is positive while $\Delta_\pi(\alpha=1)$ is negative, and Δ_π is monotonically decreasing in α for $0 \le \alpha \le 1$. When the proportion of the free audience members who would be willing to pay for the ticket is close to zero, it is obvious that the exhibitor can earn higher profits by issuing free tickets because the revenue loss from the decrease in ticket sales is dominated by the revenue gain from the increase in concession sales. However, when the proportion is close to 1, the revenue loss by the exhibitor from the decrease in ticket sales dominates the revenue gain from the increase in concession sales.   Therefore, the value $\overline{\alpha}$ denotes the breakeven value of α at which the revenue loss from the decrease in ticket sales starts to dominate the revenue gain from the increase in concession sales.

Proposition 2 implies that the exhibitor has an incentive to lower the value of α to enjoy higher profit with the issue of free tickets.   Even though the exhibitor can not decide the value of α, it is expected to exercise efforts to

affect the value.　In reality, the exhibitors often designate the effective dates for the free tickets so that the free audience members cannot use the free tickets during the holiday season when blockbuster movies are released.　In addition, they usually consider the vacancies in deciding the issuing time and quantity of free tickets.　Through this, the exhibitor tries to reduce the proportion of free audience members with a higher willingness to pay for tickets.

If the free tickets are a strategy by the exhibitor to maximize a monopolistic profit, then it is apparent that the exhibitor tends to reduce the number of free ticket issued for a movie with a higher box office power.　In addition, the exhibitor has a higher incentive to issue free tickets when it expects a higher gain from the concession sales.　Proposition 3 summarizes the effects of the box office power and the concession sales revenue on the incentive of the exhibitor to issue free tickets.

Proposition 3: *The difference* Δ_π *is a decreasing function of* a *for any parameter values while it is an increasing function of* $(P_C - c)$ *if* $b < 4/\alpha$.

Proposition 3 is straightforward to prove.　Other things being equal, the value of the intercept parameter a in the demand function be interpreted as the box-office power of a movie because an increase in a implies a higher willingness to pay for the movie by the audience members and shifts the demand curve upward.　The effect of a change in the value of a on Δ_π is obtained by

$$\frac{\partial \Delta_\pi}{\partial a} = -\frac{1}{4} b \alpha F < 0. \tag{18}$$

This result implies that the exhibitor has less incentive to issue free tickets for a movie with a higher box office power.

The effect of a change in the net revenue from concession sales, $(P_C - c)$, on Δ_π is obtained by

$$\frac{\partial \Delta_\pi}{\partial (P_C - c)} = \left(1 - \frac{1}{4} b\alpha\right) F,$$ (19)

where the sign of $\partial \Delta_\pi / \partial (P_C - c)$ is positive if $b < 4/\alpha$. Since the exhibitor has an incentive to issue free ticket for the value of α smaller than $\bar{\alpha}(<1)$, the condition holds if the demand for a movie is not so price inelastic.   If the condition holds, the exhibitor has a higher incentive to issue free tickets with an increase in the net revenue from the concession sales.

   The problem of the distributor is now examined.   Since the share of the distributor in the model is a half of the box office revenue, the difference between the profits with and without free tickets is obtained by

$$\Delta_\pi^{Dist} = \frac{1}{2} P_{PT}^M Q_{PT}^M - \frac{1}{2} P_T^M Q_T^M,$$

where the value of Δ_π^{Dist} is zero for $\alpha = 0$ and is negative for all $\alpha > 0$ because $\Delta_P = \Delta_Q = 0$ for $\alpha = 0$ and both $\Delta_P < 0$ and $\Delta_Q < 0$ for all $\alpha > 0$.   The profit of the distributor with the free tickets is smaller than that without free ticket except for the case when all free audience members are those who would not be paid audience members.

   The comparison of the consumer surplus of movie audience members with and without free tickets is difficult because there are tree different types of audience members: the paid audience members, the free audience members who would be willing to pay the ticket price, and the free audience members who would not be willing to pay the ticket prices.[14]   The number of the above three types of audience members is Q_{PT}^M, αF and $(1-\alpha)F$.   Let CS_{PT} and CS be the consumer surplus of audience members with and without free tickets.   Proposition 4 summarizes the effect of free tickets on

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[14] There is not a consideration of the consumer surplus from consuming concession sales in implicitly assuming that the willingness to pay for the concession sales for all audience is equal to the price of concession sales.   When considering the consumer surplus from concession sales, the analysis will be more complicated while it will not qualitatively change the result.   It is noticeable to consider that the consumer surplus from concession sales would strengthen the social benefit from free tickets.

consumer surplus.

Proposition 4: *Let* Δ_{CS} *be the difference between* CS_{PT} *and* CS, $\Delta_{CS} = CS_{PT} - CS$. *Then* Δ_{CS} *is strictly positive for all values of* α *such that* $0 \le \alpha \le 1$.

Proof: The consumer surplus without free tickets is calculated by

$$CS = \frac{1}{2}(a - P_C - P^M)Q^M \ .$$

The size of consumer surplus under free tickets depends on the location of free audience members whose willingness to pay is lower than the ticket price along the demand curve. Suppose that free tickets are allocated to the consumers in the order of a lower willingness to pay, then consumer surplus is obtained by

$$CS_{PT}^{\min} = \frac{1}{2}(a - P_C - P_{PT}^M)(Q_{PT}^M + \alpha F) + \alpha F P_{PT}^M + \frac{1}{2}b[(1-\alpha)F]^2.$$

On the contrary, if the free tickets are allocated to the consumers in the order of a higher willingness to pay, then the total consumer surplus is calculated by

$$CS_{PT}^{\max} = \frac{1}{2}(a - P_C - P_{PT}^M)(Q_{PT}^M + \alpha F) + \alpha F P_{PT}^M + \frac{1}{2}b[(1-\alpha)F]^2$$

$$+ [P_{PT}^M - b(1-\alpha)F][(1-\alpha)F]^2.$$

It is apparent that $CS_{PT}^{\min}$ is greater than CS, and thus $\Delta_{CS} > 0$ holds.

Q.E.D.

Proposition 4 shows that when the exhibitor issues free tickets, consumer

Figure 5   Change in Consumer Surplus with Free Tickets
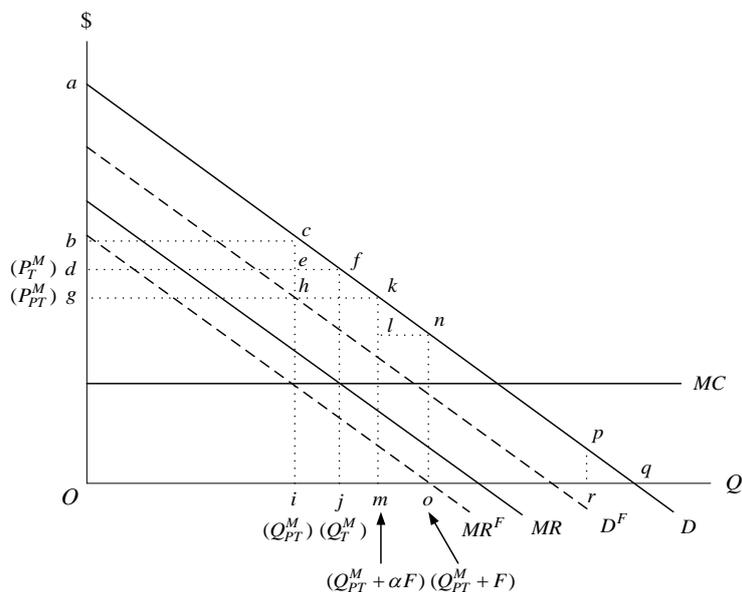
surplus of all movie consumers are higher than that without free tickets. Proposition 4 can be explained using figure 5. In figure 5, the demand curve for movie (denoted by D) shifts to D^F by the issue of free tickets because the demand for movie decreases by issuing free tickets.   The result is that the marginal revenue curve (denoted by MR) also shifts to MR^F. When there are no free tickets, the consumer surplus is measured by triangle *afd*.

With the issue of free tickets, consumer surplus for each type of audience member is measured as follows.   First, the consumer surplus of paid audience members is measured by rectangle *achg* because the ticket price is lowered from P_T^M to P_{PT}^M.   Second, the consumer surplus of the free audience members who would be willing to pay for tickets is measured by rectangle *ckmi* because they do not pay for the ticket price with free tickets. Third, the consumer surplus of the free audience members who would not be the paid audience members depends on the price they are willing to pay.   If the free tickets are obtained by consumers in the order of a lower willingness

to pay for the tickets, the consumer surplus created by enjoying free movie is triangle *pqr*. If the free tickets are allocated to the consumers in the order of a higher willingness to pay for the tickets, then the consumer surplus is rectangle *knom* because they are the consumers whose willingness to pay is located next to that of the free audience members who would pay for the ticket prices. The maximum total consumer surplus with the issue of free tickets is calculated by the sum of areas *achg*, *cjmi*, and *knom* while the minimum total consumer surplus is calculated by the sum of areas *achg*, *cjmi*, and *klm*. The minimum consumer surplus with the free tickets is greater than that without free tickets. Note that this result comes from the fact that total number of audience members for a movie can be increased by the issue of free tickets.

Given the results on the effects of free tickets on the profits of both exhibitor and distributor along with consumer surplus, it is possible to show that social welfare is increased by issuing free tickets. Let *SW* be the social welfare without free tickets and $SW_{PT}^{\min}$ be the minimum social welfare with the free tickets $SW_{PT}^{\min} = \pi_{PT} + \pi_{PT}^{Dist} + CS_{PT}^{\min}$. Proposition 5 summarizes the effect of free tickets on social welfare.

Proposition 5: *Let* Δ_{SW} *be the difference between* $SW_{PT}^{\min}$ *and* SW, $\Delta_{SW} = SW_{PT}^{\min} - SW$. *Then* Δ_{SW} *is strictly positive for all values of* α *such that* $0 \leq \alpha \leq 1$.

Proof: The social welfare is obtained by summarizing the profit of the exhibitor, the profit of the distributor, and consumer surplus. The difference between $SW_{PT}^{\min}$ and SW; Δ_{SW} is calculated by

$$\Delta_{SW} = \left(1 - \frac{1}{2}\alpha\right)F(P_C - c) + \frac{1}{2}\alpha F\left(\frac{1}{4}b\alpha F + P_{PT}^M\right) + \frac{1}{2}b[(1-\alpha)F]^2 > 0.$$

<div align="right">Q.E.D.</div>

Proposition 5 implies that social welfare increased with the free tickets.

This is because the increases in both the profit by the exhibitor and consumer surplus dominate the decrease in profit by the distributor. Free tickets can be considered a measure to enhance efficiency in the theatrical market, although it is criticized as an unfair trade conduct exercised by the market dominating major cinemas.

The results on the effects of free tickets can provide important implications on the Korean movie industry. Equation (15) shows the profit of the exhibitor increases with an increase in the price of concession sales. In addition, it is known that the exhibitor has a higher incentive to issue free tickets as the net revenue from concession sales increase. These results are related to the appearance of luxury cinemas affiliated with restaurants, entertainment rooms, and gift shops. The exhibitors try to induce as many customers as possible to visit the cinemas since the profits of the exhibitor depend highly on the revenue from sales of affiliated facilities for the luxury cinemas. Issuing free ticket is a good strategy to induce more visitors to the cinema.

It is noted that a noteworthy characteristic of the current Korean movie industry is the dominance of vertically integrated majors on the market. As the incentive of the exhibitor to issue free tickets becomes higher, the distributors need to pay higher costs to monitor the issue of free tickets. In this case, vertical integration can be a solution to the misalignment problem in incentives. The harmful effect caused by free tickets to the distributors can be solved by the joint profit maximization of vertically integrated firms.

4. SUMMARY AND CONCLUSION

This paper examines the effects of free tickets on the market performance of theatrical market in the movie industry. It is argued that the debate on free tickets comes from the misalignment of incentives between an exhibitor and a distributor through the contract for the theatrical exhibition. Although the unilateral issuing of free tickets by an exhibitor is considered an abuse of

market power by major cinemas, it is argued that there is a need to examine the effects on social welfare for the evaluation of free tickets from a social point of view.

It is found that the profit of the exhibitor with the free tickets depends on the proportion of free audience members who would be willing to pay for the ticket price to the total number of free audience members. The exhibitor has a greater incentive to issue free ticket when it expects that a smaller number of free audience members are those who would be willing to pay for the ticket prices without free tickets. Also found is that the exhibitor has less incentive to issue free tickets for a movie with a higher box office power. The profit of the distributor is decreased with the issue of free ticket except for the case when all free audience members are those who would not be paid audience members. The consumer surplus of movie audience members appears to increase with free tickets because of the fact that the total number of audience members is increased through free tickets. Social welfare is increased with the issue of free tickets because an increase in the profit of an exhibitor and consumer surplus dominates the decrease in the profit of a distributor. This paper proves the welfare improvement of free tickets in the theatrical market.

In spite of the welfare enhancing effect of free tickets, a unilateral decision of an exhibitor on the issuing of free tickets may not be free from the unfavorable effect on the profit of a distributor. A voluntary compensation scheme for the loss in the profit of a distributor can be designed to obtain a Pareto improving outcome in the theatrical market.

This paper contributes to the existing literature on the incentive misalignment problem in the exhibitor and distributor contracts. It also contributes to existing studies on the movie market by providing a simple economic model to analyze the movie market. It is expected that other problems such as movie run length and a revenue sharing scheme can also be analyzed by applying the model outlined in this paper.

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