

Economics School of Louvain - ESL

"Do the right thing": Theoretical view on the elimination of vertical restraints in Movie Industry

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Academic Year: 2022-2023

Master in Economics – 120 credits – Econometrics Focus

Erasmus Mundus Joint Master Degree in Models and Methods of Quantitative
Economics

Acknowledgments

I would like to thank my Thesis Director, Professor Johannes Johnen, for his great involvement and his helpful guidance, for accepting in the first place to trust me with his brilliant supervision.

I would also thank my reader, Professor Bertrand Wigniolle, who will make possible the end of my studies with the discussion of final work.

Finally, I would also like to dedicate this work in honour of Irina Lukashova (1962-2022), Head of the EMM Department, who bravely fought cancer. Rest in peace.

ABSTRACT

In 1948, Department of Justice (DOJ) banned studios from owning movie theaters due to the formed cartel in movie distribution and theater markets¹. The new rules led to more fair competition, but there were also negative consequences: the fact that both studios and cinemas added margin separately caused price increasing. This is what is called the double marginalization problem. However, after 72 years, the ban was canceled due to technological, economic and market changes. This decision can be seen as a new stage for the film industry. In this work, I want to be among firsts to find out if new opportunities for studios would benefit ordinary viewers and other participants of the market and whether it is worth changing their strategies. Theoretical models were created and results imply higher income for Integrated case, but lower prices for consumers with Profit-Sharing.

¹ United States v. Paramount Pictures, Inc., 334 U.S. 131 (1948).

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1 Introduction

By the decision of the DOJ, major studios (Paramount, Loew's, Warner, RKO, Fox, Universal, Columbia, United Artists) had to sell their theatrical assets. Consequently, not a single movie company retained the privilege of ownership. This decision was prompted by the studios' formation of a powerful cartel that engaged in practices like block booking² and blind bidding³, manipulating prices, and more. The cumulative effect of these actions created an anti-competitive landscape within the film industry, resulting in detrimental consequences for both viewers and other participants in the market. By August 2022, movie producers now are again able to have theatric assets, what brought me to the topic of this thesis: is it better for the studio and the theatre to integrate now?

Taking over integration is a rather difficult process and extremely difficult to reverse. Although an integration may fall under rent terms, they are still long-term and it would be difficult to change the type of contract for films in the blink of an eye.

This work will primarily be of interest to film studios and cinemas for better alignment, and since data on the profitability of integration in the US is not yet available, this paper provides primarily a theoretical analysis. Having a two-level game and adding significant extension, I will follow the methodology of next papers, where authors adhere to backward induction: McGuire and Staelin (1983)- Vertical Integration under upstream duopoly and good differentiation; Fontenay et al. (2005) - upstream competition with bargaining; Bian et al. (2018) - upstream collusion with downstream monopoly; Bourreau et al. (2011) - Integrated upstream duopoly and 3 downstream competitors. All these works have in common the setup of a multi-stage game, basically a two-stage game: firstly, upstream goes and presents the wholesale price that downstream has to pay; in the second stage, downstream chooses the final price and sells goods to consumers. In each of the above models only linear contracts and integration have been considered, furthermore, in the same framework I extend the game for profit-sharing.

From the results of my models, integration is the best solution for firms, but not for viewers. Because even with integration, a strategy such as Profit-Sharing yields lower prices, which is more important for viewers. I doubt that these results will remain the same when the model becomes more complex, because I further described that integration has

² If a theater wanted to screen a particular movie, the studio could give it in a bundle with other not-so-desirable pictures.

³ Theater owners didn't know exactly what they were going to show.

the feature of increasing competition, and that higher prices for viewers can compensate for higher diversity.

The paper is organized as follows. In the next section, I reveal the features of both vertical markets in general and the film industry, as well as what specifics to take into account. I also describe the institutional features of current setting. Next, in Section 3, I develop a simple two-stage game for the final stage of film distribution and screening, apply different contracts, and show the results in Section 4 for different strategies. Finally, I show in which direction further research should be taken to delve deeper into the question and conclude in Section 5.

2 Literature review

The main themes addressed by this work are vertical supply chain and the film industry. The combination of these two works is quite rare. Former category involves limited final good with cost and price per feasible unit, while movies are hard to put in that frame, as intellectual good (once a movie is produced, it can be repeatedly shown without incurring additional production costs); works on the latter rarely focus on internal relations between the participants and more on separate processes, since many aspects of movie industry are publicly closed.

To dissect current state of the available strategies, let's first look at the supply chain of vertically related markets, namely concentrate on problem such as double marginalization⁴. However, the issue is not that two parties add margins. The very process of adding margins is natural for every industry, but when an upstream manufacturer and downstream retailer do it separately and the final price exceeds what a single entity would set, there is an impact on the demand of others in that chain and it can hurt everyone in the market. For instance, in the work titled Gabrielsen et al. (2018) the negative externalities associated with double marginalization can be mitigated by introducing a shelf-price. This approach suggests that retailers bill producers instead of consumers, resulting in more beneficial outcomes. However, this solution is narrowly tailored and not well-suited for the film industry in its current form. This chapter aims to explore general strategies that can be applied to address the unique challenges faced by the film industry within the context of the supply chain.

⁴ In Gil (2015), author illustrates the existence of double-marginalization problem in movie industry

2.1 Vertical markets literature

The most common strategic choices are as follows⁵:

- Vertical Integration
- Revenue-sharing contracts
- Resale Price Maintenance (RPM)
- Other contracts (Territorial restriction, Exclusive dealing, Collusions)

The latter category is aimed at other issues (foreclosure, exclusivity, etc.) and getting rid of double marginalization comes as an additional property. In our case, only the first two are important, as the rest contract types are used for a different type of analysis, while RPM is partly not relevant to the film industry.

Vertical Integration is widely used in many industries and Belleflamme et al. (2015) reflect on the dual nature of vertical integration under different conditions, however, most of negative externalities⁶ in my opinion, do not spread on movie industry, even though, full vertical integration has not been considered since official prohibition for studios on such action. First, many disadvantages are covering administrative efficiency, but those concern are on human-level (bad management in the small firm might be ignored, but if firm gets bigger, negative effects occur), second, what's good for one firm, always bad for its rival and DOJ always there to prevent market from harm, any complain should undergo "rule of reason"⁷ and court. One of feasible externalities is high cost of merging, which will be ignored for simplicity of analysis; a negative feature as barrier for entries of new firms, for me seems unreasonable as producing movie or opening cinema is very costly anyway. And lastly, upstream could reject integration as it brings higher competition upstream⁸, however, it is impossible to say whether this would hurt studios, as models below does not focus on competition.

One of the earliest papers comparing an integration in the movie industry is written by Bastos et al. (2006), but it refers to vertical integration in terms of the relationship between the studio and the distributor. That is, cinema theaters have long been a separate entity. More model description on this phenomenon is given in numerous research papers under different setups. McGuire et al. (2008) show that low degrees substitute goods contribute to a high chance of Vertical integration. Movies as art are very

⁵ See Belleflamme et al. (2015)

⁶ All negative externalities, defined in Harrigan (1984), are in appendix.

⁷ Under the "rule of reason," if any anticompetitive harm would be outweighed by the practice's procompetitive effects, the practice is not unlawful. It is prosecuted by US Attorney's office

⁸ Choi et al. (2016) provide evidence from movie industry.

complicated goods, as one might fully substitute another and third might be independent of others at the same time, degree of substitution varies from movie to movie. So, could it be that one integrated studio shares its movies with others? Atiyas et al. (2021) answer on this question in general case and show that if sharing goods maximizes joint profits, it increases upstream competition. Evidence will be provided further in the movie industry literature.

RPM is another strategy that has been banned since DOJ's decision. Why RPM is not applicable in the movie industry? Firstly, in theory it always being analyzed with additional effort/service from retailer⁹. That specification of RPM is discussed in many papers and by solving double marginalization problem, tends to partly decrease consumers' utility, whereas some prefers spend money on higher quality, rather than better service. Extending this, for the higher ticket price, cinemas could additionally offer a snack. People whose utility of a free snack is zero could consider that ticket price as too high. Second reason is that movie theaters show many movies of different studios, with uniform prices simultaneously, there is no possibility for single studio to control prices for whole diversity of movies.

Revenue-sharing contracts have many different techniques: Linear contracts, Two-part tariffs, Profit-Sharing, non-linear sharing and etc. Many of these contracts have a bargaining concept. In the current work focus is on linear contracts, profit sharing and slightly on two-part tariffs as the other types are quite peculiar and require additional ad-hoc assumptions.

In linear contracts setup, upstream firm sells its goods to downstream firm with the wholesale price and downstream sells final good to consumer. That's the basic method. By adding a fixed cost for downstream to pay, we move to two-part tariffs.

By Hayes (1987), it is shown that Two-part tariffs are a highly preferable strategy in a case of demand uncertainty and fixed term works as insurance instrument. Under zero-profit assumption, Fixed term is set to fill the income gap in case of low level of market potential. Why this assumption holds for cinema industry? Well, as was said before, there is a "rule of reason", which prevents studios from free-riding and putting theaters at the risk.

Profit-Sharing Contracts (PS) are concentrating on splitting profit via share, there are two main approaches, by Bart et al. (2021): 1) wholesale-price contract with revenue-sharing; 2) consignment contract with revenue sharing. The former implies that the

⁹ See Wirl (2015)

upstream sells to the downstream at price w with the additional clause that from each sale, the downstream must return some share, i.e. the ownership of the commodity is passed down. The latter suggests that the downstream is only an intermediary of the good, which is the property of the upstream until it is sold to the final consumer, this concept fits movie industry.

Now, moving on to the film industry, it is necessary to dig deep into all the strategies described and see if they fit the realities of the industry.

2.2 Movie industry related literature

The film industry has had a rich history with its ups and downs. As a completely new form of technology in the 19th century, early movies were a small snippet of some actions, whether it was a train approaching or people walking along an avenue. After a fast-developing stage, film producers began to open the first cinemas¹⁰, showing films of decent length, similar to modern standards. With increasing popularity, cinema had become yet another production industry with its own peculiarities and primal chaos¹¹. Which came to a conspiracy of big players.

A very strict decision, which was aimed at making competition healthier, has, on the contrary, led to even less diversity and stagnation for decades. Coupled with technology progress, the post-war era, a lot of poor-quality movies and many other reasons, prices have risen and the demand for cinema has declined. Many studios have responded by lowering their supply, making fewer low-budget films. This, in turn, led to the fact that the quality of films became approximately the same, and hence the prices of tickets. Victory over corporations could be considered, if the practice of a uniform price did not become widespread in the 70's. Theaters eventually lost their power, after which they returned to the practice that differentiated films are shown at the same price. Orbach (2004) wraps it altogether and concludes, that uniform prices should not be applied in movie sector. More is described in Orbach (2007), where author also gives examples from modern history in different countries, where the practice of different prices only increased profits for market participants. An addition in that direction is an example of that sort of system, gaming industry, where many games are sold according to their informal class division. (Which is ironic, since this division comes from the film industry, where AAA movies were the most expensive blockbusters and B-movies were considered cheap

¹⁰ On 19th of June 1905, first cinema known as “Nickelodeon”, started to operate, showing movies all day

¹¹ See Chazelle (2022)

amateur films). Despite all this, in such closed industry, where rumors play an important role and where actors' missteps a decade ago bring quite noticeable reputational risks to studios, the uniform price is desirable for market participants and not for final consumer. Reynolds (2013) shows that both theaters and studios are interested in aggregate demand and try not to increase quality, but correspond to the average price. This characteristic is one of the most important attributes of the film industry. What else can be seen as important feature?

Anyone going to the cinema has ever come across a snack counter, the history of which comes from traditional theatres with canteen. At first glance, a seemingly insignificant formation should have no impact on the decision making. However, by taking annual financial statement of Cinemark Holdings, Inc for 2022 (one of the biggest cinema chains in US and Canada), we can see that with total revenue of \$2 454.7m, snacks are \$938.3m (cost is \$169.3m) or 38% while Admissions are \$1 246.9m or 50%. But the fact that part of admissions should be shared with the film studios should be taken into account, profit from snacks is even higher than tickets' one. More numbers from companies' reports are in Table 1.

Table 1. North America theaters revenue comparison, 2022

	Admissions	Concessions
AMC		
Revenue	2 201.4 (56% of total)	1 313.7 (34% of total)
Cost	1 051.7	228.6
Profit	1 149.7	1 085.1
Cinemark		
Revenue	1 246.9 (50% of total)	938.3 (38% of total)
Cost	704.4	169.3
Profit	542.5	769
Cineworld + Regal*		
Revenue	582.4 (54% of total)	356.9 (33% of total)
Cineplex		
Revenue	464.3 (37% of total)	381.4 (30% of total)
Cost	238.9	87.7
Profit	225.4	293.7

**report only for first 6 months with no operation costs because of bankruptcy of Cineworld in USA. However, chain remains operating.*

It is seen that more than 30% of income are concessions. If we take biggest chain, AMC Theatres, indeed market power is high enough to secure major part of admission income.

One of the first papers that contains concession analysis is Gil et al. (2007), where authors analyze cinema chain data from Spain and show what factors influence concessions purchase, noting that the larger the group, the higher probability of purchase; additionally, purchases are higher if a consumer spends less time buying ticket, say, using a vending machine or online, because they spend more time watching concessions. In the following work Gil & Francine (2012), authors provide an evidence from the same data that moviegoers who buy concessions have higher willingness to buy movie ticket. However, there they assume that concession demand is not affected by ticket price, which is strong assumption. In the authors' analysis, concessions demand decreases with higher number of moviegoers, framing the logic of 'metering' price discrimination, according to which if a person values a primary product very highly, on average, they are willing to spend more on secondary services. That is, the prices of these services should be even higher, what they suggest. However, the authors themselves point out that they cannot say whether this model is appropriate and that special research is needed.

Another work, that is similar to mine, is Baranchuk et al. (2019), gives some discusses how sliding scale contracts¹² affect release and screen time. However, this paper does not compare this type of contract with vertical integration. Moreover, authors also make strong assumption, saying concessions income comes as externality that does not affect strategy choice and equated it to zero.

Summarizing the above, the following features are highlighted to the film industry:

- Concession income (snacks)
- Uniform price for all films, depending on the theater
- Demand uncertainty

Now it would be more interesting to dig in different papers, analyzing movie market. Film production is a very complex process, with decisions being made at many different stages. Early in the process, some people compare choosing films to make in the early stages as choosing assets for a portfolio, minimizing risk as Sacco & Teti (2020). Moving on to production, many other decisions have to be made, such as product placement,

¹² “[S]liding-scale contracting whereby the distributor (studio) takes a much larger (usually around 70%) share of box-office revenues than the exhibitor (theater) in the week of a movie’s release, with the exhibitor’s share increasing, in gradual steps, over subsequent weeks.”

optimizing marketing channels, choosing a release date and more. The final stage of the film's life, its distribution to cinemas and optimization within the cinema, is a core of this thesis.

Works in their mass about the restrictions by DOJ are critic and show that the decision did not have a positive effect on the market. The most remarkable and directly related work is Gil (2015), which describes and provides evidence from the US 1940s data, that integrated chains charged lower than other cinemas due to elimination of the double marginalization, as says author. However, it is hard to distinguish if the reason of the price difference was due to inefficiency or double marginalization. For example, in next two works, it is seen, that indeed movie market participants achieve higher productivity.

Non-price advantages of VI were described by Kim et al. (2020). It examines how much the benefit for viewers increases compared to other theaters in Korea. With the help of extensive data from the industry, author was able to calibrate the model. As a result, the example shows that integrated cinemas operate more efficiently and bring more value to the audience (more seances and higher diversity).

Another work of this author, Kim (2022), is focused on chain affiliation in the Korean movie industry. It shows that indeed, belonging to a chain brings its advantages, such networks are also more efficient than conventional cinemas in terms of movie diversity, however under chain affiliation they assume both vertical and horizontal integration.

The Choi et al. (2016) paper looked at how vertical integration affects competition in the Korean cinema market. The paper noted that integrated cinemas are willing to show films of their competitors, but the quality standard for independent studios is higher than for others. At the same time, the willingness to show pictures from Vertical competitors is higher.

3 Theoretical analysis

This section will show different simple static models describing the strategies mentioned above. For simplicity, vertical relationships will be shown for one Upstream studio and one Downstream cinema theater. Based on common sense, we can assume that the studio will not offer such disadvantageous conditions that the cinema will refuse. All agents are risk-neutral, but in the case of a guaranteed income from a popular film, the studio will not be able to take the entirety of the income because of the “rules of reason”.

To focus on the strategic choice of the price let's consider zero cost for the theater and fixed budget for the movie that is given, since in reality the final outcome and demand of a picture remains a mystery before first distribution weekend and it is impossible to tell how many people it will attract at the budget-setting stage.

Structure of the game is next:

- 1) Upstream studio (player 1) produces movie with a market potential a and budget B and decides what kind of contract to propose to rent it to theater (player 2).
- 2) Downstream theater maximizes profit by choosing final price and quantity of movie. (I assume, that theater cares much more on the fact that people will go to cinema¹³, which is q)

In many works, terms of profit-sharing contracts are realized as bargaining parameters, given as market power and realized as random variable¹⁴. But in our setup, we could use them as maximizing parameter.

Quantity q here may be realized as total number of screens, séances or just a total number of moviegoers for whole showing period. To solve this game, backward induction is used with respect to the positivity of the parameters.

The same demand function will be used to compare different models:

$$p = a - q \quad (1)$$

Where p is a price, a is a market potential for a movie.

As said, theater now have an additional income in form of concessions sales. Moreover, it is considered as an additional spendings of moviegoers, since in most of the cases without having ticket, they are not allowed to use these facilities.

3.1 Linear contract model

Under linear contract I assume that theater pays studio per every moviegoer that purchases ticket:

$$\Pi_U = wq - B \quad (1.1)$$

$$\Pi_D = (p - w + s)q \quad (1.2)$$

- Where w is a pay-per-view return price for the studio,
- s is a snack term, an average expected spendings per customer. In current setup, it is treated as state variable, but further it will be expended.
- B is a budget of the movie (in many cases full information about budget is only available to studio, while public only gets approximation or rumors)

¹³ As viewers flow is producing concession income.

¹⁴ See Giannoccaro & Pontrandolfo (2009).

Substituting demand function of (1) in (1.2) and taking First-Order Condition:

$$p^* = \frac{a}{2} + \frac{w}{2} - \frac{s}{2} \text{ and } q^* = \frac{a}{2} - \frac{w}{2} + \frac{s}{2} \quad (1.3)$$

By putting optimal q^* into profit function of upstream studio, it is now:

$$\Pi_U = w \left(\frac{a}{2} - \frac{w}{2} + \frac{s}{2} \right) - B \quad (1.4)$$

Where maximization is possible by choosing corresponding w . By F.O.C.,

$$w^* = \frac{a}{2} + \frac{s}{2} \quad (1.5)$$

Which is now transforming (1.3)

$$p^* = \frac{3a}{4} - \frac{s}{4} \text{ and } q^* = \frac{a}{4} + \frac{s}{4} \quad (1.6)$$

3.2 Vertical integration model

Let's see if vertical integration will bring any improvements in that case. Now, instead of two companies, we have one that produces the film and shows it in its cinema. Profit function is next now:

$$\Pi_I = (p + s)q - B \quad (2.1)$$

With the same demand function, by F.O.C.

$$p^* = \frac{a}{2} - \frac{s}{2} \text{ and } q^* = \frac{a}{2} + \frac{s}{2} \quad (2.2)$$

It is immediately seen that prices are lower than in previous case.

3.3 Profit-sharing model

Many chains practice non-linear contracts and negotiate some aspects after start of screening. Let's focus on another revenue-sharing technic, Profit-Sharing, where upstream and downstream split the profit and get share α and $1 - \alpha$ of total ticket income respectfully. $\alpha \in [0; 1]$ Maximization for upstream and downstream now:

$$\Pi_U = \alpha pq - B \quad (3.1)$$

$$\Pi_D = (1 - \alpha)pq + sq \quad (3.2)$$

As before, using F.O.C., it is feasible that

$$p^* = \frac{a}{2} - \frac{s}{2(1 - \alpha)} \text{ and } q^* = \frac{a}{2} + \frac{s}{2(1 - \alpha)} \quad (3.3)$$

What makes prices here lower than in cases before.

3.4 Two-parts tariff model

Another technique is two-parts tariff, where upstream company sets wholesale price (pay-per-view) for each moviegoer and an additional lumpsum amount (can be seen

as licensing price). Downstream firm maximizes its profit by choosing the price and quantity for movie, while snacks income is given:

$$\Pi_U = wq + F(a, w \dots) - B \quad (4.1)$$

$$\Pi_D = (p - w + s)q - F(a, w \dots) \quad (4.2)$$

Where $F(a, w \dots)$ is a fixed cost. It is worth noticing, that studio in reality maximizes profit by pay-per-view rate and Fixed licensing cost at the same time, I assume it is an indicator to see how confident studio is about its asset, which is a decreasing function of wholesale price w . In other words, maximization is done by choosing pay-per-view rate and depends on other parameters.

Again, starting from the end, maximization for downstream gives same results as in linear contract case in (1.3). Putting results into (4.1) we get next:

$$\Pi_U = w\left(\frac{a}{2} - \frac{w}{2} + \frac{s}{2}\right) + F(a, w \dots) - B \quad (4.3)$$

$$\Pi_D = \left(\frac{a}{2} - \frac{w}{2} + \frac{s}{2}\right)^2 - F(a, w \dots) \quad (4.4)$$

From (4.4), by assumption of profitability, Π_D should not be negative, that is why it is possible to define maximum for licensing cost:

$$F(a, w \dots) \leq \left(\frac{a}{2} - \frac{w}{2} + \frac{s}{2}\right)^2 \quad (4.4)$$

If studio decides to put it equal to zero, we are back to linear contracts, which is maximum. The only difference is now that studio will extract higher or lower part, depending on bargaining power.

By setting $w = 0$ and then control for F , studio forwards decision-making to theater and just extracts what it wants in the beginning. That fixed cost is a common cost in each type of contracts, but here is assumed that it is also an instrument.

This type of contract can ideally fit in a more advanced model that exploits the market power of all market participants and movie risk. The fixed license price is an add-on that comes out of the comparative analysis with other forms of contract, because it includes the amount of risk, and what parameters affect it each studio chooses differently. From the analysis we can only conclude that in this case the parameters will not be very different from those in the linear case.

4 Results

Main result of these models is next: profit sharing price is lower even than integrated case. Why is it so? Intuition behind that is theater has an incentive to set a

lower price for the ticket, attract more moviegoers and extract an income from snacks, which is more interesting in the case, when theater gets lower part of the profit.

Table 2. Price and profit comparison.

	Linear contract	Integration	Profit-sharing
Ticket price	$\frac{3a}{4} - \frac{s}{4}$	$\frac{a}{2} - \frac{s}{2}$	$\frac{a}{2} - \frac{s}{2(1-\alpha)}$
Downstream profit	$\frac{(a+s)^2}{16}$	—	$\frac{1-\alpha}{4} \left(a + \frac{s}{(1-\alpha)}\right)^2$
Upstream profit	$\frac{(a+s)^2}{8}$	—	$\frac{\alpha}{4} \left(a^2 - \frac{s^2}{(1-\alpha)^2}\right)$
Total profit	$\frac{3(a+s)^2}{16}$	$\frac{(a+s)^2}{4}$	$\frac{a^2}{4} + \frac{2as}{4} + \frac{s^2(1-2\alpha)}{4(1-\alpha)^2}$

Why Upstream might not be happy in that setting? With lower price, downstream entices number of viewers more than monopoly quantity. And we see that snack variable reduces price with a higher rate, given share α . If studio takes almost all of the profit, theaters are interested only in concession sales, what makes them set ticket profit as low as possible. Upstream want to have smaller cut from the movie tickets to make sure that cinema will not sale tickets too cheap. Then why would companies choose that type of contracting? Baranchuk et al. (2019) have also come to similar case, however there it was an instrument of upstream to stimulate downstream to show pictures on a long distance by increasing theaters part of income after first or second week. Gil & Francine (2012) bring evidence from the Spanish movie market of utility of such contracts.

This feature of a complementary service gives us the intuition behind the fact, that in real life studios don't really get a greater part of the movie showing, even though they produced the good.

What about total profit? As it is seen, Integrated case is a better option, comparing to linear, what cannot be said about PS case. They are the same in case when $\alpha = 0$, what makes downstream company receive whole profit. Is it feasible? In current setup no, since upstream by choosing any share more than 0 will get higher profit, it would go for it. Same feature can be seen in Two-part tariffs case with pay-per-view rate equals 0.

For numerical solution different maximization methods could be used¹⁵ and there is an optimal choice for Upstream profit, however it is not giving much in terms of

¹⁵ such as Newton's method or gradient descent to approximate the solutions numerically.

theoretical analysis. Does it mean it's completely uninformative? Well, if we compare its total surplus with one of Integrated case and expand square of sum, we can see, that only change is $\frac{(1-2\alpha)}{(1-\alpha)^2}$ and in order to be positive, the numerator has to be positive, what makes $\alpha \leq 0.5$. Upstream and downstream firms would perform worse than integrated ones.

Comparing PS case with linear demand it also can be seen that if $\alpha \leq 0.5$ and if $s \leq a$, what means concession sales for that movie is lower than movie's market potential (which is almost always satisfied), total profit is always greater for PS case and prices are lower.

4.1 Concessions extensions

Many cinemas are located in so-called entertainment areas, neighboring with bowling, slot machines, arcades, photo booths and more, all fall under the term concessions, which are part of theater. The most common service is food, which is more expensive than in any other shops and restaurants, but people buy it anyway. Most chains provide annual information about food revenue and costs, but attraction income in many cases combined under "other" category and is hard to separate. Only in report of Cineplex Inc there is a mention of "amusements" revenues, however costs are again hidden. So, setting aside the other factors, amusement income there is \$246m, when food brings revenue of \$381m and \$294m net profit, from which I deduce that only food would be implied by concessions. How do firms take it into account? At the level of a movie studio, it would be time-consuming to fill in the prices of each item in each theatre or force the theatres to share such information. The theatre itself analyses its own parameters and maximizes the price with them in mind. To contribute, I assume that the demand for tickets is in no way dependent on the cost of snacks.

I realize that this assumption does not always hold, as there are different moviegoers and a study dedicated to this issue needs to be done to complete the picture. Down I clarify what this assumption would look like and correct the analysis with that addition.

I will take the usual demand function for complimentary goods, taking into account that the ticket price would affect the demand for snacks, but not in the opposite direction. That is, the following demand function must be added to complement (1)

$$q_s = s - \beta p_s - \theta p \quad (5)$$

where s is a market potential for a concession and p_s is a corresponding price. θ is a degree of complementary which is usually from -1 to 1 (if -1 goods are perfect substitutes, for 1 - perfect complements and independent when zero¹⁶). I assume that concessions are perfect complement for tickets. For simplicity β is also assumed to be 1. In that case, s should be higher than ticket price, otherwise snacks demand is 0, since high ticket prices make concessions unattractive to the customer.

Table 3. Updated profit functions

	Upstream	Downstream
Linear contract	$\Pi_U = wq - B$	$\Pi_D = (p - w)q + p_s * q_s$
Integration	$\Pi_I = pq + p_s * q_s - B$	
Profit-sharing	$\Pi_U = \alpha pq - B$	$\Pi_D = (1 - \alpha)pq + p_s * q_s$

Upgraded profit functions for previous cases in Table 3 need to be maximized. Maximization process is almost the same, but with additional variable of snack price what makes it more complex. For downstream, firm's maximization happens by choosing optimal quantity of movie tickets and concession prices.

Table 4. Price and revenues comparison with upgraded demand.

	Linear contract	Integration	Profit-sharing
Ticket price	$\frac{5a - s}{6}$	$\frac{2a - s}{3}$	$\frac{2a(1 - \alpha) - s}{3 - 4\alpha}$
Concession price	$\frac{7s - 5a}{12}$	$\frac{2s - a}{3}$	$\frac{(1 - \alpha)(2s - a)}{3 - 4\alpha}$
Downstream profit	$\frac{13a^2 - 22as + 13s^2}{48}$	—	$(1 - \alpha) * \frac{(2a - 2\alpha a - s) * (a - 2\alpha a + s)}{(3 - 4\alpha)^2} + \frac{(1 - \alpha)^2(2s - a)^2}{(3 - 4\alpha)^2}$
Upstream profit	$\frac{(a + s)^2}{24}$	—	$\alpha * \frac{(2a - 2\alpha a - s) * (a - 2\alpha a + s)}{(3 - 4\alpha)^2}$
Total profit	$\frac{5a^2 - 6as + 5s^2}{16}$	$\frac{a^2 - as + s^2}{3}$	$\frac{(2a - 2\alpha a - s) * (a - 2\alpha a + s)}{(3 - 4\alpha)^2} + \frac{(1 - \alpha)^2(2s - a)^2}{(3 - 4\alpha)^2}$

¹⁶ Following McGuire and Staelin (1983), Bian et al. (2018)

By looking at the Table 4, some results remain their simplicity, while others hard to see. By comparing ticket prices for all cases, once again lowest one is in PS case, highest in linear. Moving to prices of concessions, picture is opposite: Linear concessions are the cheapest and PS are the most expensive.

It is worth noting that all parameters must be positive numbers, which now leads to parameter requirements, e.g. for linear contracts from the ticket price, since it cannot be negative, comes $5a - s \geq 0$, and from the concession price $7s - 5a \geq 0$ and, therefore, $5a/7 \leq s \leq 5a$. Following same logic, for integration case $0.5a \leq s \leq 2a$. From a PS case, for each $\alpha \leq 0.75$ there are different bounds exist and they shrink towards 0.5 as α goes up ($0 \leq s \leq 2a$ when α is 0; to $0.4a \leq s \leq 0.6a$ when α is 0.7; and $s = 0.5a$ when α is 0.75) What that gives in perspective of strategic choice? When movie produces low demand for a concession, $[0.5a; 5/7a]$, from Figure 1, theaters always prefer PS contracts, while theaters' profit is higher when s is lower than $0.62a$.



Figure 1. Upstream profit comparison with s and shares changes.

As an assumption of zero costs was applied, current analysis reflects profit parameters. With this assumption, upper bound of $2a$ is not exceeded by many chains, referring to Table 1. I take into account that different movies create different demand on snacks, but I doubt that it is two times as big as admissions profit. For illustrative purposes of profit-sharing analysis, I fix a/s ratio equal to 0.6 and in Figure 2 it is shown, that there exists choice of share that will increase profit for upstream.

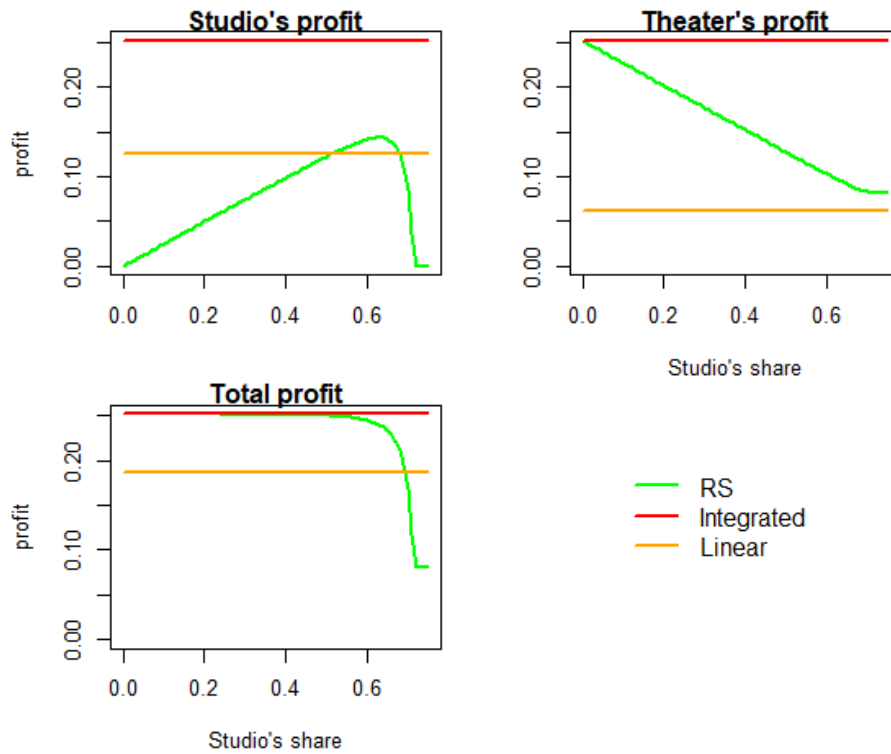


Figure 2. Profit comparison of different contracts, left top – for upstream company; top right – downstream; left bottom – total profit.

From the same Figure 2 it is clear that integrated case gives increase for studio. The straight line at the end of the PS case shows that when a studio wants to take a high share of the profits, the theatre will put a minimum price for the film so that as many people as possible will come and purchase concessions. So again, while solving the double marginalization problem, the theatres are still letting the consumer down with the price of snacks.

4.2 Potential extensions

As this work is one of the firsts trying to describe basic market relations of movie industry, there are many additions and extensions to current setups.

To begin with, we can take it one step further towards snacks. This paper considers the one-way effect of ticket prices on snacks, but this set up is valid for specific-moviegoers who go to the cinema for a particular picture, however it may not work for regular-moviegoers. To really understand whether there is a connection, it is necessary to conduct experiments or access private theater chain's data on how much the demand for tickets changes when the price of concessions changes.

It has also been noted that important concepts such as risk and market power have been ignored, but this will also add considerable depth to the analysis. Another extension

can be made is in terms of the film market and produced pictures. Since cinema is one of the most highly competitive fields, it would be worth adding competition between studios as well¹⁷. Furthermore, the movies compete with each other for a larger share of the box office, not the cinemas. For example, demand function might follow McGuire and Staelin (1983) for an upstream competition. Moreover, as mentioned earlier, if a studio releases a film that has a low degree of substitution, it is more likely to make it an exclusive of its integrated cinema.

More research depth can also be gained by bringing in dynamics. Another feature of the film is that the opening weekend is crucial to the box office of the picture and sheds light on whether the picture is high demand or whether it is a rubbish.

5 Conclusion

This paper has looked at the film industry, which, although popularity, is extremely scarce on information about concessions, with revenues of more than 30% of the total, and profits in some places comparable to those of the cinema. From theoretical analysis, it can be seen that the profitability of snacks can have a very strong influence on the decision of theatres. And in a case like PS, if a studio asks for a very high share of the profit, the theatre will simply put its interests above, reduce the price, attract more viewers and make a profit from the snacks that they don't have to share with the rest. However, there is no strategy that is better than Integration for both participants. From the point of view of ordinary viewers, PS contracts are a more desirable strategy as ticket prices are lower than on the integrated chain. However, the results need to be checked again, as mentioned above, integration has a negative effect on studios as it increases competition while also increasing diversity for viewers.

It was also pointed out in which direction it is worth working to get results to deepen the analysis compared to the current one.

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¹⁷ Upstream competition was shown in Fontenay et al. (2005), as well as adding bargaining

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Appendix

Advantages	Disadvantages
<i>Internal benefits</i>	<i>Internal costs</i>
Integration economies reduce costs by eliminating of tasks, reducing duplicated activities overhead and cutting costs (technology dependent)	Need for overhead to coordinate vertical integration increased costs
Improved coordination of activities reduces inventorying and other costs	Burden of excess capacity from unevenly balanced minimum efficient scale plants (technology dependent)
Avoid time-consuming tasks, such as price shopping, communicating design details, or negotiating contract	Poorly organized vertically integrated firms do not enjoy synergies that compensate for higher costs
<i>Competitive benefits</i>	<i>Competitive dangers</i>
Avoid foreclosure to inputs, services, or markets	Obsolete processes may be perpetuated
Improved marketing or technological intelligence	Create mobility (or exit) obstacles
Opportunity to create product differentiation (increased nesses value added)	Links firm to sick adjacent businesses
Superior control of firm's economic environment (market power)	Lose access to information from suppliers and distributors
Create credibility for new products	Synergies created through vertical integration may be overrated
Synergies could be created by coordinating vertical activities skillfully	Managers integrated before thinking through the most appropriate way to do so

Source: Harrigan(1984)