



# **The Economic Conditions for Adoption of a Universal Communication Protocol by the Gaming Industry: An Analytical Map**

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## Executive Summary

This paper presents a simple game theoretic model to help members of the Gaming Standards Association evaluate the viability of the industry-wide communications protocol from an economic perspective. The model assumes a limited pool of large clients, served by three equipment manufacturing firms. The firms control different shares of the market.

Every firm owns a proprietary communications protocol. Separate protocols make it costly for a client to replace gaming devices of one firm with those of another. An outside party proposes an industry-wide communications protocol. The model shows that due to divergent objectives of market-seeking and profit-seeking firms the adoption of universal standard cannot occur without strategic decision by the firms' clients to obtain equipment only from the "standardized" firms. The model also specifies conditions under which client activism successfully brings all firms into the fold of standardization.

# 1 Introduction

On the official homepage of the Gaming Standards Association (GSA), year 2004 is named the “Year of Delivery”. Such a prominent name is not a coincidence – it signifies the extraordinary opportunities that GSA hopes to realize by launching two groundbreaking standards to its membership for review and approval.

The first standard, known as Best of Breed (BOB) is a global protocol for secure communication between gaming devices and systems. According to the GSA “the BOB standard encompasses the function of existing best of breed protocols and will be free of third-party licensing requirements.” The second standard is called System-to-System (S2S) and it represents “a solution for gaming operators and game and system manufacturers for communicating information between applications, projects and/or systems.”

GSA is clearly enthusiastic about the potential improvements the proposed standards offer to the gaming industry. According to BOB Committee Co-Chairman James Morrow of Bally Gaming and Systems, the BOB standard “sets a foundation for industry growth on a par with such consumer standards as TCP/IP, HTTP, and the like. We expect to see an explosive increase in innovation in the gaming industry with the release of the BOB protocol.”

David Nehra of Mandalay Resort Group – the Chairman of the GSA S2S Committee shares the enthusiasm of his BOB counterpart. “We are on the verge of revolutionizing the industry. S2S will provide a standard for communicating information between applications, projects and/or systems, and will eliminate the need for unnecessary, proprietary development. The result will be dramatic savings in labor hours for both manufacturers and operators, and it also increases speed to market for new products.”

The excitement of the GSA officials is very understandable. “Unlike such large computer companies like IBM and national phone corporations like AT&T, the gaming industry had no “standard” form of computer communication before GSA was established,” – says the official GSA homepage. “As a result, today’s casino industry is flooded with nearly 50 “languages” required to allow various types of gaming equipment to function properly.” Clearly, from the technological perspective replacing the 50 “languages” of gaming equipment with the universal standard makes perfect sense. The question remains, however, about the *economic* viability of the standardization project.

Since gaming equipment manufacturers – like all firms – care first and foremost about their bottom line, standardization will not pick up unless the firms feel confident that in the new world of the standard their business operations will fare at least as well (and preferably better) than in the current situation. Hence the driving argument in favor of the new standards must be of an economic, rather than technical nature.

The purpose of this paper is to construct a simple game-theoretic model that would help the members of GSA to evaluate the viability of the standardization project from an economic perspective. The following section lays out the basic assumptions necessary to create a functional model. Next I discuss priorities of different firms with respect to standardization. Section 4 contains a simple model that predicts the firms’ strategic behavior and outcome of the “standardization game”. Finally, I model the effect of client activism on the universal standardization of the industry. I end with a few conclusions and recommendations.

## 2 The Model and Assumptions

### 2.1 The marketplace

Imagine a market that contains buyers and sellers of gaming equipment. The market is characterized by a limited number of large buyers (henceforth, clients) that are served by three manufacturers (henceforth, firms) over a large number of time periods  $T$  ( $T = 1, 2, 3 \dots$ )

### 2.2 Firm sizes

The firms control different shares of the market for gaming equipment. Two smaller firms control 15 percent of the market each, while the larger firm controls the remaining 70 percent of the market.

Due to its size the larger firm realizes economies of scale. Economies of scale exist when more units of a good or a service can be produced on a larger scale, yet with less input costs on average. Alternatively, this means that as a company grows, and production units increase, a company will have a better chance to decrease its costs.

### 2.3 Firm profits before standardization

Before standardization each firm's profit is greater or equal to zero. Let's define a firm's profit –  $\Pi$  – as the difference between the firm's revenues and costs. Revenues of a firm are given by the product of its unit price –  $P$  – and the total number of units sold –  $Q$ . Meanwhile, costs are defined as the product of a firm's unit cost –  $K$  – and the total number of units produced –  $Q'$ . For simplicity assume that the number of units produced equals the number of units sold.<sup>1</sup> A firm's ability to operate without losses under the status quo can be formally expressed in the following way:

#### Inequality 1

$$\Pi_{SQ} = Q_{SQ} \times (P_{SQ} - K_{SQ}) \geq 0$$

### 2.4 The products

The firms are identical in terms of their product assortment. That is, gaming devices sold by each firm act as perfect substitutes.

### 2.5 Client objectives

Each client has a finite demand for gaming equipment. That is, a client buys a finite number of gaming devices per time period. Every client seeks to minimize the price per unit of equipment bought. Moreover, let's assume that senior management of client companies can own stock of manufacturing firms.

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<sup>1</sup> From this point on I shall use  $Q$  to denote the total quantity of units produced/sold.

## 2.6 Communication protocols and an effort towards standardization

Every firm owns a proprietary communications protocol, which makes it costly for a client to operate a piece of equipment made by one manufacturer on a gaming floor installed by its competitor. A client must incur a transition cost (TC), in order to replace gaming devices of one manufacturer with those of another.

Let's assume that an outside party proposes an industry-wide communications protocol. Acceptance of the new protocol carries a fixed acceptance cost (AC) for each manufacturing firm. For the sake of simplicity assume that AC is negligibly small.<sup>2</sup>

Each manufacturing firm chooses whether to accept or to reject the proposed standard. If all three firms accept, the new *universal standard* (US) comes into being. If two firms accept, and one firm rejects then the accepting firms become parties to a *partial standard* (PS) while the rejecting firm finds itself *outside of the standard* (OS). If less than two firms accept the standard, the *status quo* (SQ) persists.

If the universal standard is accepted, clients can buy gaming equipment from several firms without incurring the potential transition cost. Consequently competition under the universal standard accelerates to a point where each manufacturer is a price-taker.

If the partial standard emerges, clients do not incur a potential TC by buying from those firms that are parties to the partial standard. Consequently competition within the partial standard rises up to a point where each manufacturer is a price-taker. Buying from a manufacturer outside the standard still carries a potential TC.

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<sup>2</sup> Alternatively it can be assumed that acceptance costs are cancelled out by the reduction of costs that a manufacturer realizes under the common standard.

## 2.7 Firm objectives

Assume that every manufacturer wants to avoid losses at any cost. In other words a firm will support standardization only if its profit under the common standard is equal to or greater than zero. Inequality 2 shows this objective formally.

### Inequality 2

$$\Pi_{US} = Q_{US} \times (P_{US} - K_{US}) \geq 0$$

Further, assume that two small firms are market seekers and the large firm is a profit seeker. Market seeking firms strive to maximize their number of clients served as a share of total clients in the industry. To support standardization a market-seeking firm must not only meet the condition of Inequality 2, but also anticipate that the new standard will effectively expand its market share.

Unlike market-seeking firms, which derive value simply from adding new customers, profit-seeking firm will support standardization only if it expects that the new standard will boost its bottom line. Inequality 3 shows this objective formally.

### Inequality 3

$$Q_{US} \times (P_{US} - K_{US}) > Q_{SQ} \times (P_{SQ} - K_{SQ})$$

Substantively, Inequality 3 means that a profit seeking firm will embrace standardization only if the new standard allows it to cut costs, raise prices, increase sales or do all those things together.

## 2.8 Information, and attitude toward risk

Every manufacturing firm is perfectly informed about possible outcomes of its interactions with other firms and the value of these outcomes to itself, to the other two firms and to clients. For the sake of simplicity assume that all firms are risk neutral.

## 3 Priorities

### 3.1 Firm Priorities

To extract the best possible result from their interaction every manufacturer first has to rank the four outcomes of the standardization process in order of their preference. Given the character and objectives of the three firms, only the following two preference orderings are relevant for the purposes of this model:

#### Inequality 4

$$PS > US = SQ > OS$$

#### Inequality 5

$$PS > SQ > OS > US$$

Inequality 4 represents priorities of a market seeking firm, which anticipates operating without losses under the new standard. Meanwhile, the combination shown by Inequality 5 corresponds to priorities of a profit seeking firm which expects to realize profit by joining the standardization.

Note that Inequality 4 and Inequality 5 represent the most optimistic scenarios for both profit-seekers and market-seekers. Alternative preference orderings could be derived to show priorities of, say, a market seeking firm that anticipates losses or a profit seeking firm that expects no profit under the new standard. In the remainder of the paper, however, I assume that true priorities of the firms are given by Inequality 4 and Inequality 5.

I choose to exclude other preference orderings because they are substantively less interesting than those represented by Inequality 4 and Inequality 5. If both market seeking and profit seeking firms are pessimistic about their chances under the common standard, then predictably, they will refuse to accept the new communications protocol, and status quo will prevail. Likewise, if the market seeking firms alone expect to reap benefits under the common standard, then a partial standard will emerge with the profit-seeking firm remaining outside of it.<sup>3</sup>

When both the market-seekers and the profit-seeker share favorable expectations about the business opportunities under the common standard, however, the outcome of their interaction is more interesting. As I will show in the following sections of this paper, even when all firms are optimistic about attaining their goals with the joint communication protocol, the profit-seeking firm has incentives to sabotage emergence of the universal standard.

I will further show that the optimistic expectations of market seeking and profit seeking firms create promising conditions for effective client activism that might lead to the adoption of the universal standard. Before formally proving these results, however, it might be worthwhile to examine the reasoning behind specific combinations given by Inequality 4 and Inequality 5.

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<sup>3</sup> Please see the Appendix for the formal proofs of the assertions contained in this paragraph.

## 3.2 Understanding the preference orderings

### 3.2.1 What happens if a market seeking firm expects to operate without losses under the new standard?

If a market seeking firm anticipates no losses under the new standard, it will be generally optimistic about the standardization. Its top priority will consist of operating under a partial standard (PS). Its worst nightmare – remaining outside of the standard (OS). Working under the universal standard (US) as well as under status quo (SQ) rank in the middle of the firm's priorities list.

*What's so special about PS? (And what's so bad about OS?)*

The answer to this question is simple: market seeking firms prefer to work under the partial standard, because this would allow them to lure the potential clients of the firm remaining outside of that standard. The new clients would not want to buy gaming units from an "out of standard" firm –  $F_{OS}$  – because such a firm could not credibly commit not to raise prices at time period  $T = 2$ . Moreover, some traditional clients of  $F_{OS}$  would also switch to firms operating under PS.

Say in a time period  $T = 1$  a client had decided to buy gaming devices from the out of standard firm  $F_{OS}$ . Once period  $T = 2$  arrives, this client might be considering a purchase of equipment from a "partially standardized" firm –  $F_{PS}$ . Assume that the nominal price charged by  $F_{PS}$  is equal to  $P_{PS}$ . The real price –  $P_{PS}^*$  – faced by the client, however, is equal to the sum of the nominal price and the transition cost. Formally:

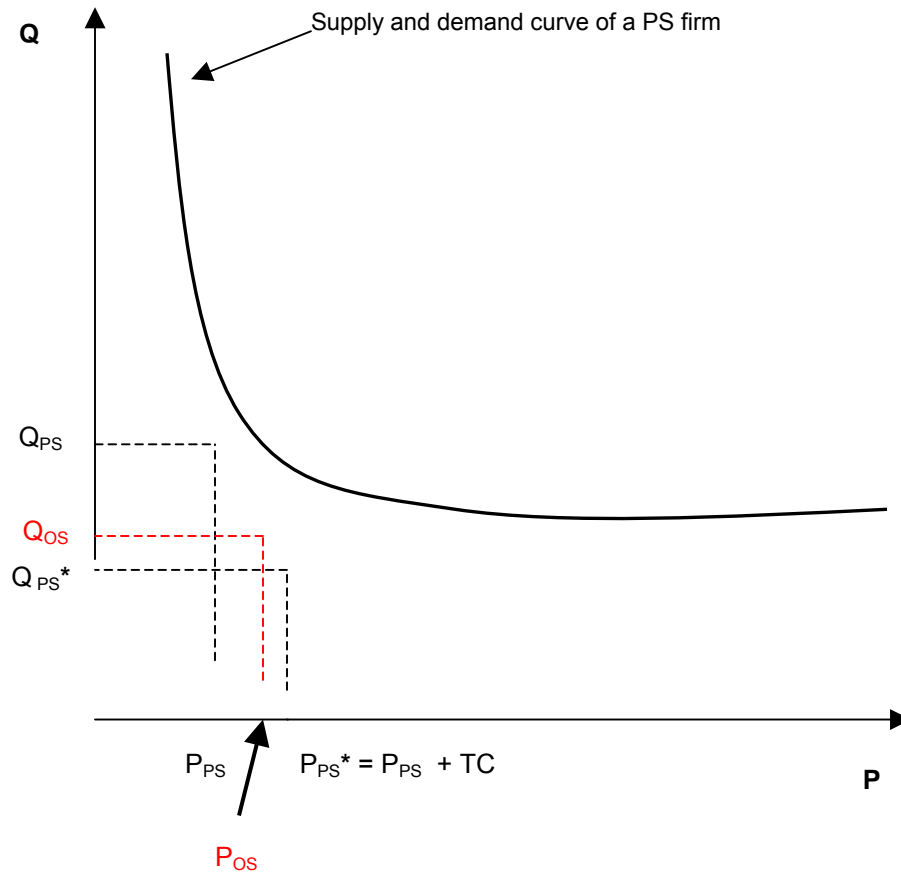
#### Equation 1

$$P_{PS}^* = P_{PS} + TC$$

Hence, the real price is always greater than the nominal price. Assuming perfect information,  $F_{OS}$  knows the predicament of its client, and will offer an out of standard price –  $P_{OS}$  – that is only marginally smaller than  $P_{PS}^*$ . Consequently, by buying equipment from  $F_{OS}$  at  $T = 1$  the client limits its ability to benefit from manufacturer competition at  $T = 2$ , thus raising the future equipment price. Picture 1 provides an illustration of the client's dilemma.

Even if  $F_{OS}$  pledged ahead of time to match  $P_{PS}$  at  $T = 2$ , such a promise cannot possibly be credible. Having bought equipment from  $F_{OS}$  at  $T = 1$  the client would give up an opportunity to exit costless at  $T = 2$ . The un-standardized firm  $F_{OS}$  in turn would have no reason to keep its promised price level. Anticipating the unfavorable pricing situation in period  $T = 2$ , a rational client would never buy equipment from  $F_{OS}$  at  $T = 1$ . Due to its inability to credibly commit to match competitors' prices,  $F_{OS}$  would experience a sharp decrease in new clients.

**Picture 1**



The question remains, however, what will be the behavior of those clients who have obtained gaming devices from  $F_{OS}$  before it had opted out from the new standard? Will they remain loyal to  $F_{OS}$  or switch to its competitors under the “partial standard”?

The answer to this question depends on how forward looking are the current clients of  $F_{OS}$ . A forward looking client might decide that the discounted future value of low “standardized” price outweighs the one-time transition cost, and switch away from  $F_{OS}$ . A less forward looking client, in the meantime would decide to remain with  $F_{OS}$  because for such a client, the transition cost would exceed the discounted future value of the low  $P_{PS}$ . Consequently,  $F_{OS}$  would experience a limited amount of switching-away by its older clients.

With the stream of new clients declining even more sharply than the old ones, the “out of standard firm” would almost certainly see the shrinking of its market share. Anticipating such disastrous consequences every market seeker would prefer partial standardization to remaining out of the standard.

### *Why US is equal to SQ? (And why are they in the middle?)*

According to Inequality 4 a market seeking firm is indifferent between operating under the universal standard and remaining with the status quo. The reason for this indifference is that under both US and SQ the market seeking firm does not have any advantages or handicaps to the expanding of its market share relative to the competition. By assumption, under the universal standard all firms become price takers, and sell manufacturing equipment at cost. Under the status quo the firms would be able to charge their old customers the higher price – the cost of the machine plus the transition cost. However, this ability does not give any of the firms a competitive edge in terms of attracting new clients. Considering firms' desire to maximize their market share, then, the manufacturers find US and SQ equally appealing.

Both, US and SQ, however, would be more desirable outcomes for a market seeking firm than the unfortunate OS. A market-seeker would always prefer to operate under US or under SQ rather than under OS, because being a part of the universal standard (or of status quo) would protect them from the devastating loss of its clients to the “standardized” competition.

Likewise, every manufacturer would prefer to find itself under PS rather than under US or SQ, because with all firms operating under a universal standard (or under the status quo) no one can benefit from luring clients away from the OS firms, as would have been possible under the partial standard.

Consequently, a market seeking firm which anticipates no losses under the common standard possesses the priority list similar to that, given by Inequality 4. Its top priority consists of operating under a partial standard. Its worst nightmare – remaining outside of the standard. Working under the universal standard or under the status quo rank in the middle of the firm's priority list.

### **3.2.2 What happens if a firm is a profit seeker?**

A profit seeking firm's top priority consists of operating under a partial standard. Such a firm, however, would be quite reluctant to work under the universal standard. Finally, operating outside of the common standard or under status quo rank in the middle of the firm's priorities list.

Unlike its market seeking rivals, the profit seeking manufacturer is not afraid of losing a battle for new clients to other standardized firms. Remember, by assumption the profit seeker is a large firm, capable of realizing economies of scale. Its competitors, in the meantime cannot benefit from economies of scale due to their small size. Consequently, the profit seeker should be able to meet the new low price that emerges under the common standard.

The problem is that the profit seeking firm does not *always* care to sell at a low price, because doing so might diminish the firm's margin, and reduce its profit. The profit seeking firm would be willing to standardize if and only if an increase in the number of units sold under the new standard would be so great as to offset the aggregate decrease in margin due to a reduced price. In other words, if selling each unit more cheaply (although still at a slight profit) allowed the profit-seeking firm to increase total amount of units sold significantly, then this firm might find it useful to adopt the common standard.

Given the setup of this model, the opportunity to increase turnover is the greatest when two firms operate under a partial standard, while the third firm remains outside of the standard. For this reason the profit seeking firm prefers most of all to operate under a partial standard.

While the profit seeking firm embraces partial standardization, it is most unhappy under the universal standard. If all firms in the industry adopt the universal standard, the profit seeker must lower its prices in order to avoid losses, but it can not count on attracting a large number

of new customers, like it did under the partial standard. For this reason universal standard ranks at the bottom of the profit seeking firm's priority list.

Remaining outside of the standard is slightly more attractive to the profit-seeker than competing in a fully standardized industry. Being the only un-standardized firm in the industry the firm might experience difficulty attracting new clients. However, it could still charge high prices for most of its old clients. Given its huge market share, such an outcome would be definitely more attractive for the profit seeking firm than the vagaries of competition under the universal standard.

Finally, remaining under the status quo presents the second best outcome for a profit seeking firm. Status quo is superior to the universal standard, because it allows the firm to charge its clients higher prices. It is also better than being outside of a standard, because under status quo a firm is not handicapped with respect to attracting new customers. These features make status quo second only to partial standard on the priority list of the profit maximizing firm. Consequently, the profit seeking firm that does not expect losses under the common standard possesses the priority list similar to that, given by Inequality 5.

## 4 Modeling interaction among the firms

### 4.1 The setup

In this section of the paper I model interaction between the three firms, characterized by preference orderings from Inequality 4 and Inequality 5. The graphical version of the model can be seen in picture 2. The model assumes sequential nature of the firms' decisions, with a market seeking firm deciding first, followed by another market-seeker, and finally followed by a decision of the profit seeking firm.

Notwithstanding the sequential nature of this game the behavior of the three firms and the outcome of the game does not depend on the order in which the choices are made. If, for example, a profit seeking firm chooses first, it will not behave any differently than it would, had it chosen last.

As I have shown in Picture 2, each firm has an option to choose between two actions – accepting the new common standard, or rejecting it. If all three firms accept the new communications protocol, the universal standard comes into being. In the model this outcome is indicated by the three payoffs – US, US, US – at the top right hand side of Picture 1. These payoffs simply represent the outcome of the game for all three firms. The first payoff belongs to the first market-seeking firm, the second payoff belongs to the second market seeking firm, and the third payoff – to the profit seeking firm.

If two firms accept, and one firm rejects then the accepting firms become parties to a partial standard while the rejecting firm finds itself outside of the standard. In other words, if the first market seeking firm rejects the standard, while the other two accept, the payoffs for the three firms will look in the following way: OS, PS, PS. If the second manufacturing firm is the only one to reject the standard, the payoffs will be: PS, OS, PS. Finally, if the profit seeking firm is the only one rejecting the new communications protocol, the payoffs for the firms will be: PS, PS, OS.

If at least two firms reject the proposal, then status quo persists, and the payoffs for the three firms are SQ, SQ, SQ.

All firms know their preferences as well as the preferences of their competitors. Firms are also aware of the decisions that have already been made by their competitors earlier in the model. Based on the available information each firm chooses an action that will bring it the highest possible payoff at the end of the game.

### 4.2 Solving the model

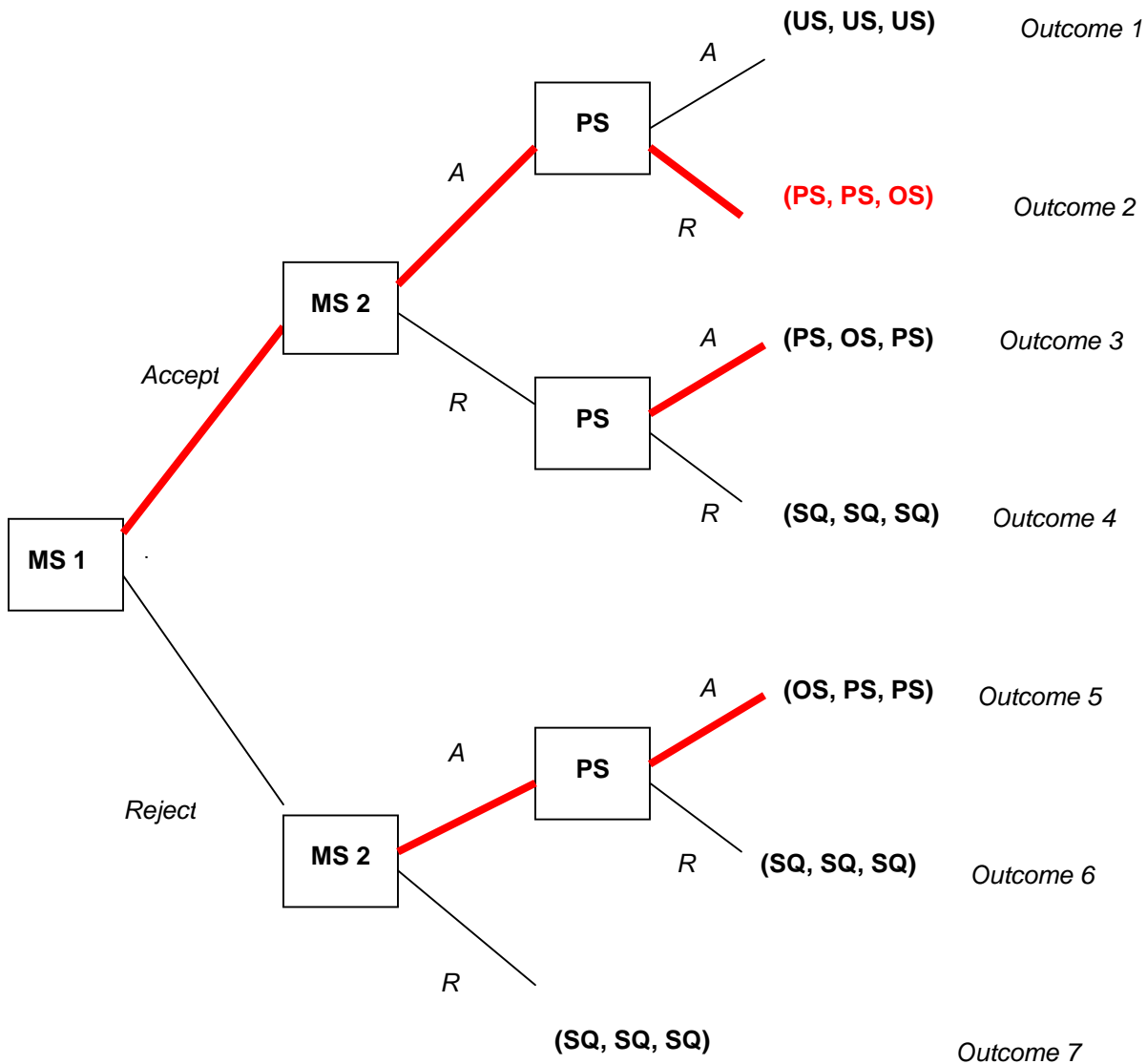
The simplest way of predicting firms' behavior from the model represented in Picture 1 is known as backwards induction. As the word "backwards" indicates, prediction of firms' strategies begins with the last firm to chose, and continues to its predecessors.

**Picture 2**

Priorities of the firms:

Market seekers (MS 1 and MS 2):  $PS > US = SQ > OS$

Profit Seeker (PS):  $PS > SQ > OS > US$



Equilibrium strategies of the firms:

MS 1: Accept

MS 2: Accept if the first firm accepts and accept even if the first firm rejects

PS: Reject if the first two firms accepted, accept otherwise.

Outcome: PS, PS, OS

### *Decisions of the profit making firm*

The last firm making a choice in Picture 2 is the profit-seeker. At the top right corner of the picture the profit seeking firm faces a choice of joining the new universal standard, or remaining outside of the standard. Such choice is determined by the profit seeking firm's payoffs – US if it accepts the standard, and OS, if it doesn't. These payoffs can be seen at the end of the top two payoff rows in Picture 2. Given its priorities, the profit seeking firm prefers to stay outside of the standard, and chooses to reject the common protocol. Such a decision of the firm is indicated by a thick red line.

At the middle decision node the profit seeking firm faces a choice between working under the partial standard and remaining under the status quo. The firm decides in favor of the partial standard. Finally, at its bottom decision node, the profit seeking firm once again chooses a more desirable PS over SQ.

### *Decisions of the second market seeking firm*

Next, let's analyze decision-making of the second market seeking firm. At its top decision node the firm knows that if it accepts the new communications protocol, then the profit seeking firm will choose to opt out of the new standard.<sup>4</sup> In such a case the second market seeking firm will end up operating under the partial standard. This outcome is shown by the payoff PS in the middle of the second payoff row.

Alternatively, if the second market seeking firm chooses to reject the standard, the profit seeking firm will accept the new common protocol, leaving the second market seeking firm outside of the new standard. This outcome is shown by the payoff OS in the middle of the third payoff row. Given such circumstances the choice of the second market-seeker is obvious. At its top decision node the firm chooses to accept the new standard.

At its bottom decision node the second market seeking firm will compare the payoffs of working under the partial standard, and remaining in the status quo (the middle payoffs in the 5<sup>th</sup> and 7<sup>th</sup> payoff rows.) Given its preferences, the firm will choose to accept the new standard at its bottom decision node.

### *Decisions of the first market seeking firm*

Finally let's take a look at the choices of the first market seeking firm. If this firm chooses to accept the universal standard, it knows that the second market-seeker will also accept the new communication protocol, but the profit-seeker will reject it, leaving the first market seeking firm working under the partial standard.<sup>5</sup> However, if the first market seeking firm chooses to reject the new communications protocol, it will remain outside of the new standard, as the other two firms will choose to standardize. Facing such a choice the first market seeking firm does not have to think twice before it decides to embrace the new communications protocol.

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<sup>4</sup> To see this, please follow the thick red line.

<sup>5</sup> To see this, please follow the thick red line.

### 4.3 Conclusion so far

According to the outcomes of the model represented in Picture 2, acceptance of the new universal communications protocol by all manufacturers is not possible without exogenous interference.

Given the divergent preferences of the market seeking and profit seeking firms the standardization process resembles the game of “chicken”. This game – actually played by American teenagers in the 1950s – consisted of two participants driving at each other on a narrow road. The first to swerve would lose face among his peers. If neither swerved, however, both risked injury or even death. Naturally, the equilibrium of the “chicken” game is for each player to do the opposite of what his rival is doing.

Although the model presented in this section includes more than two players, it nevertheless follows the principle of the “chicken” game – the last firm to choose standardization will always chose an opposite action than its predecessor. Consequently, standardization stops short from including all firms. While the two market seeking firms will always accept the proposed standard – either out of desire to work under the partial standard or out of fear of being left out – the profit seeking firm will always sabotage the universal standardization. Ironically, this uncooperative outcome emerges when both market seeking and profit seeking firms are optimistically inclined with respect to the new standard.

## 5 Changing the profit seeker's heart

The firms' inability to adopt the industry-wide communications protocol is bound to have negative consequences for their clients. The clients of the profit seeking firm are the ones who suffer most outside of the partial standard. As I have shown in section 3.2.1, by staying outside the standard, the profit seeking firm can afford to charge relatively high prices on its old clients and – thanks to the transition cost – keep them from switching to the cheaper standardized providers.

If a client is sufficiently forward looking, however, it might choose not to tolerate the price abuse of the un-standardized profit seeking firm. As I have pointed out in section 3.2.1, a forward looking client might decide that the discounted future value of the low “standardized” price outweighs the one-time transition cost, and switch from the profit seeking firm to its market seeking competitors.

In fact, the forward looking quality of clients is the most effective way to bring about the change in the priorities of the profit seeking firm, and make it embrace the universal standard. If a few sufficiently large clients threaten to switch to the “standardized” competition, the profit seeking firm might become less fond of remaining outside of the standard, and prefer the universal standard instead.

Such a change of heart of the profit seeking firm is realistic, because a loss of a few large customers in an industry characterized by a limited number of large buyers means (a) a significant and nearly irreplaceable decrease in turnover, and (b) an inability to achieve low costs due to economies of scale. Both of those consequences would diminish the firm's profit. Given strategic action of forward-looking clients those consequences might be sufficiently costly to make the profit seeking firm value work under the universal standard more than remaining outside of the standard. The new set of priorities of a profit seeking firm then would look like this:

### Inequality 6

$$PS > SQ > US > OS$$

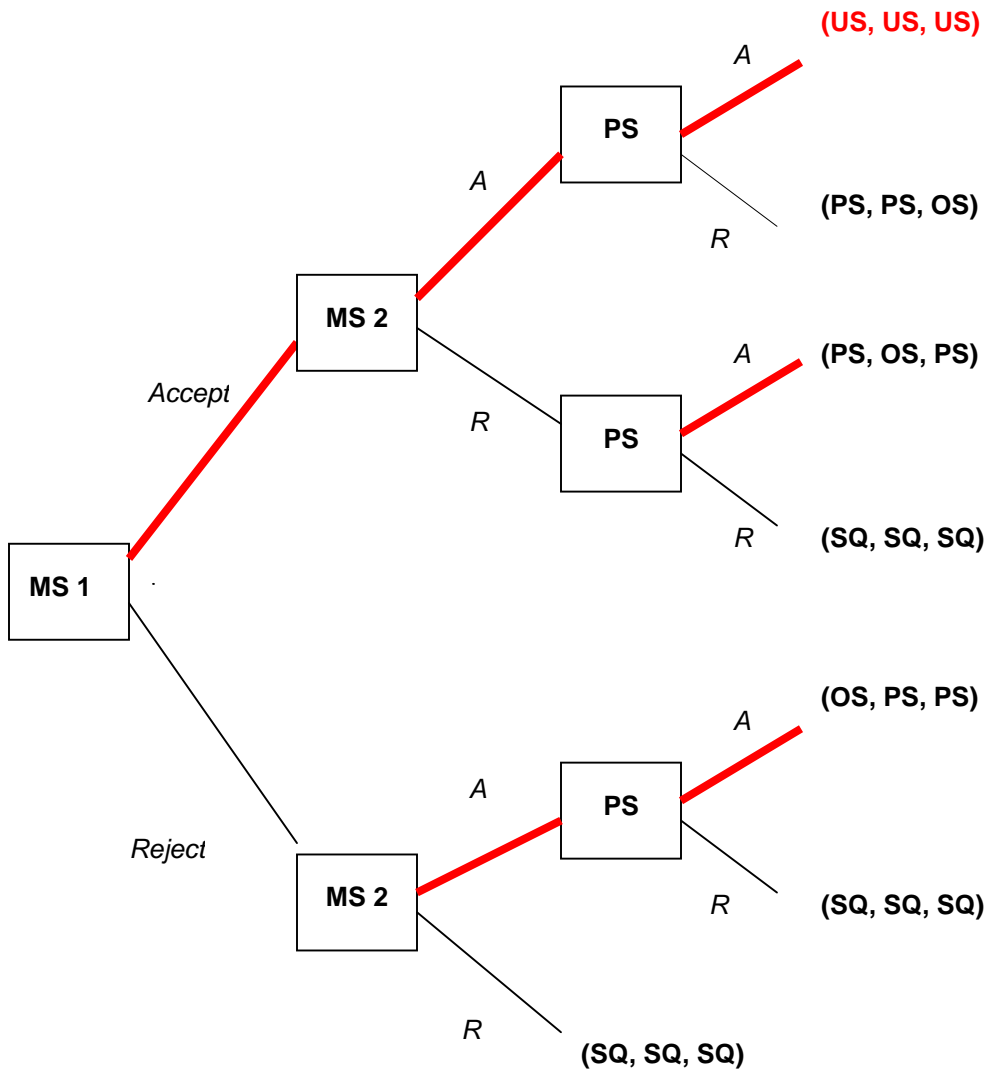
Given that market seeking firms would maintain the preference ordering from Inequality 4, the strategic interaction between the three manufacturers would be much more conducive to the emergence of the universal standard. These results are shown in Picture 3.

**Picture 3**

Priorities of the firms:

Market seekers (MS 1 and MS 2):  $PS > US = SQ > OS$

Profit Seeker (PS):  $PS > SQ > US > OS$



Equilibrium strategies of the firms:

MS 1: Accept

MS 2: Accept if the first firm accepts and accept even if the first firm rejects

PS: Accept regardless of what the first two firms have decided.

Outcome: US, US, US

Using the method of backwards induction, described in section 4.2 it is possible to predict that client activism can indeed result in a universal adoption of the industry-wide communications protocol. If a profit-seeking firm anticipates a large client switching to the standardized competitors, it will be much more likely to embrace the universal standard.

What happens, however, if the profit seeking manufacturer does not believe in the credibility of its client's threat? If the firm "calls the client's bluff" the client must deliver on its threat and actually switch away from its provider to force standardization. Such an action, however, might prove to be a little tricky as every client would have an incentive to free ride, and wait for *another* client to switch and internalize the transition cost.

Picture 4 provides the formal illustration of free-riding. If the first client is expected to switch to the standardized manufacturer, it is always better for the second client to stay with the profit seeking firm and benefit from the imminent standardization without paying the transition cost. When the second client decides to switch, however, it is better for the first client to stay with the profit seeking provider. If both clients share such attitudes, they both might fail to switch and continue paying the high prices of the profit seeking manufacturer.

Note, however, that when neither client expects the other to switch from the profit seeking provider, both clients might in fact find it worthwhile to switch on their own. The decision whether to switch or not will be determined by whether the client values future low prices more or less than the transition cost. Once again, a forward looking client is the key to induce the profit seeking firm to embrace the universal standard.

**Picture 4**

		CLIENT 2	
		SWITCH	STAY
CLIENT 1	SWITCH	Client 1: gets low prices, but also incurs transition cost Client 2: gets low prices, but also incurs transition cost	Client 1: gets low prices, but also incurs transition cost Client 2: gets low prices without incurring transition cost
	STAY	Client 1: gets low prices without incurring transition cost Client 2: gets low prices, but also incurs transition cost	Client 1: continues paying high price, incurs no transition cost Client 2: continues paying high price, incurs no transition cost

On a different note, clients' ability to effectively threaten their supplier might be limited if senior management officials in the clients' firms own equity in the profit-seeking manufacturer. Such a relationship creates strategic and ethical difficulties for the client firms, because their senior management might be less inclined to pursue policies that are best for achieving their company's goals. In such cases, client activism might need to be "jumpstarted" by investor activism that would ensure that client firms really try to minimize the price of their purchases, eventually forcing the profit seeking manufacturer to embrace the industry-wide communications protocol.

## 6 Conclusions

The model presented in this paper suggests that adoption of the universal communications protocol requires meeting three conditions. First, the equipment manufacturing firms must be “optimistic” about business opportunities under the common standard. This means that market seeking firms should expect to operate without losses under the partial and the universal standard, while profit seeking firms should expect to realize profit at least under the partial standard.<sup>6</sup>

Next, some of the major clients of the profit seeking manufacturer must be sufficiently forward looking to credibly induce their provider to accept the common standard. The clients’ decision to act in a forward looking fashion and to switch to the cheaper standardized providers depends among other things on the size of the transition cost. The smaller the TC, the more likely the clients will be to switch, and the more likely the manufacturer will be to adopt the industry-wide protocol.

Finally, for the greatest effectiveness of client action, no senior officials in the client companies should own equity in the profit seeking manufacturing firm. If top officials of a client firm own their provider’s equity, investor activism is in order to ensure the credibility of the client’s bargaining position with its provider.

The model presented in this paper is a departure point for practical strategizing and empirical analysis of the standardization of the gaming industry. In terms of practical strategizing, this model offers a basic framework within which more complicated aspects of the standardization can be discussed. For the econometricians, meanwhile, the model provides a list of theoretical conclusions in need of rigorous statistical testing.

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<sup>6</sup> Note that due to the setup of the model a firm will be able to operate without losses under the universal standard if it can do so under partial standard and vice versa.

## APPENDIX

The following pages contain the formal proofs of the assertions in the fourth paragraph of section 3.1.

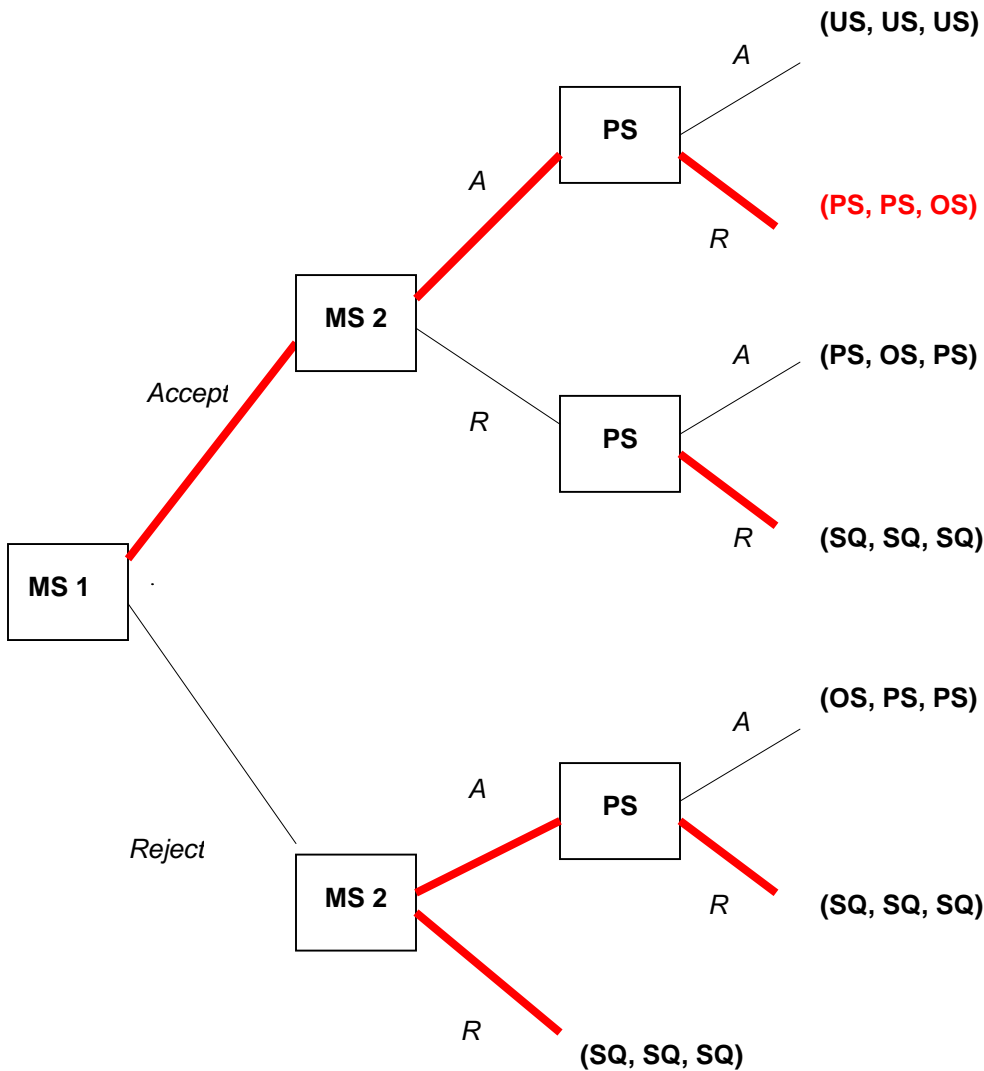
**Picture A 1**

What happens when the market seeking firms expect no losses under the common standard, but the profit seeking firm anticipates not profits under PS?

Priorities of the firms:

Market seekers (MS 1 and MS 2):  $PS > US = SQ > OS$

Profit Seeker (PS):  $SQ > OS > PS = US$



Equilibrium strategies of the firms:

MS 1: Accept

MS 2: Accept if the first firm accepts and indifferent (accept or reject) if the first firm rejects

PS: Reject, reject, reject

Outcome: Partial standard: PS, PS, OS

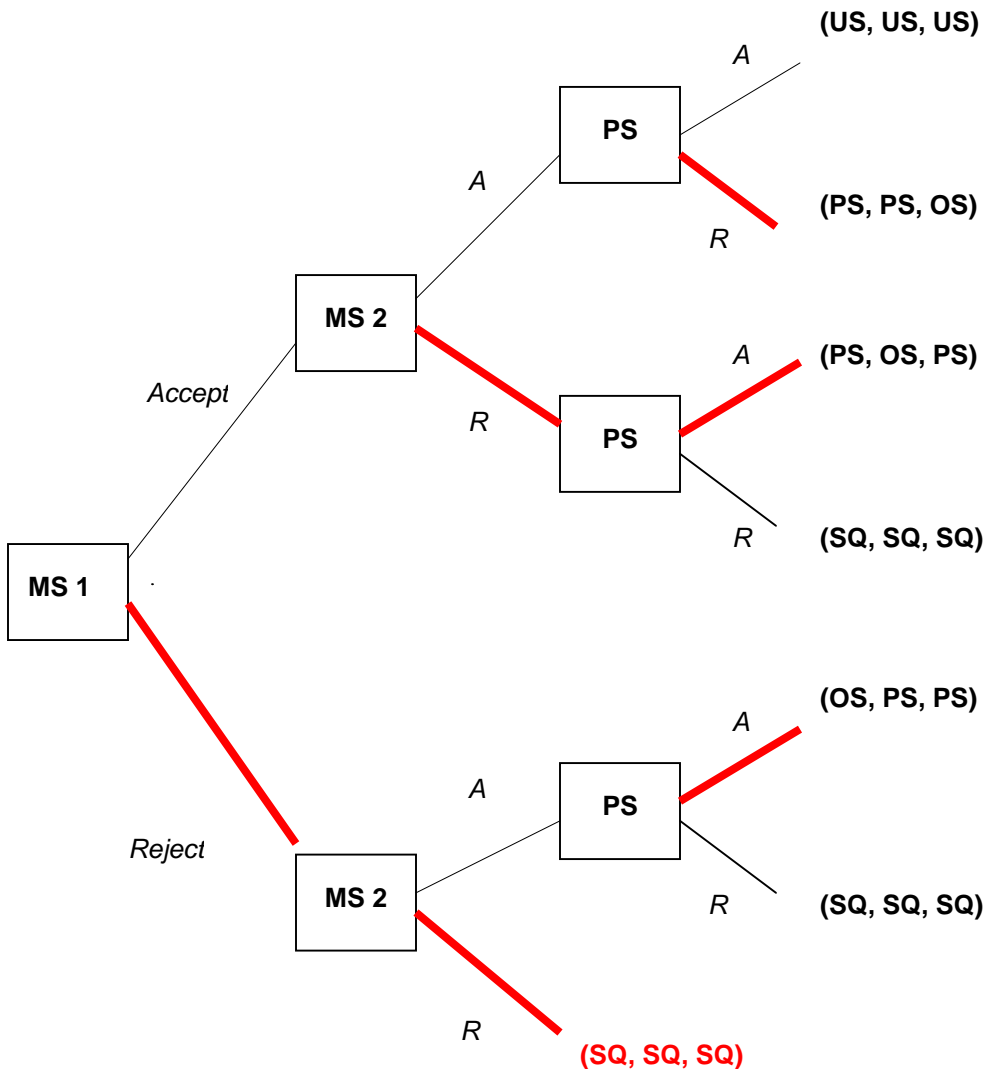
**Picture A 2**

What happens when the market seeking firms anticipate losses under the common standard, but the profit seeking firm still expects to realize profits under PS?

Priorities of the firms:

Market seekers (MS 1 and MS 2):  $SQ > OS > PS = US$

Profit Seeker (PS):  $PS > SQ > OS > US$



Equilibrium strategies of the firms:

MS 1: Reject

MS 2: Reject if the first firm accepts and reject if the first firm rejects

PS: Reject, accept, accept.

Outcome: Status quo: SQ, SQ, SQ

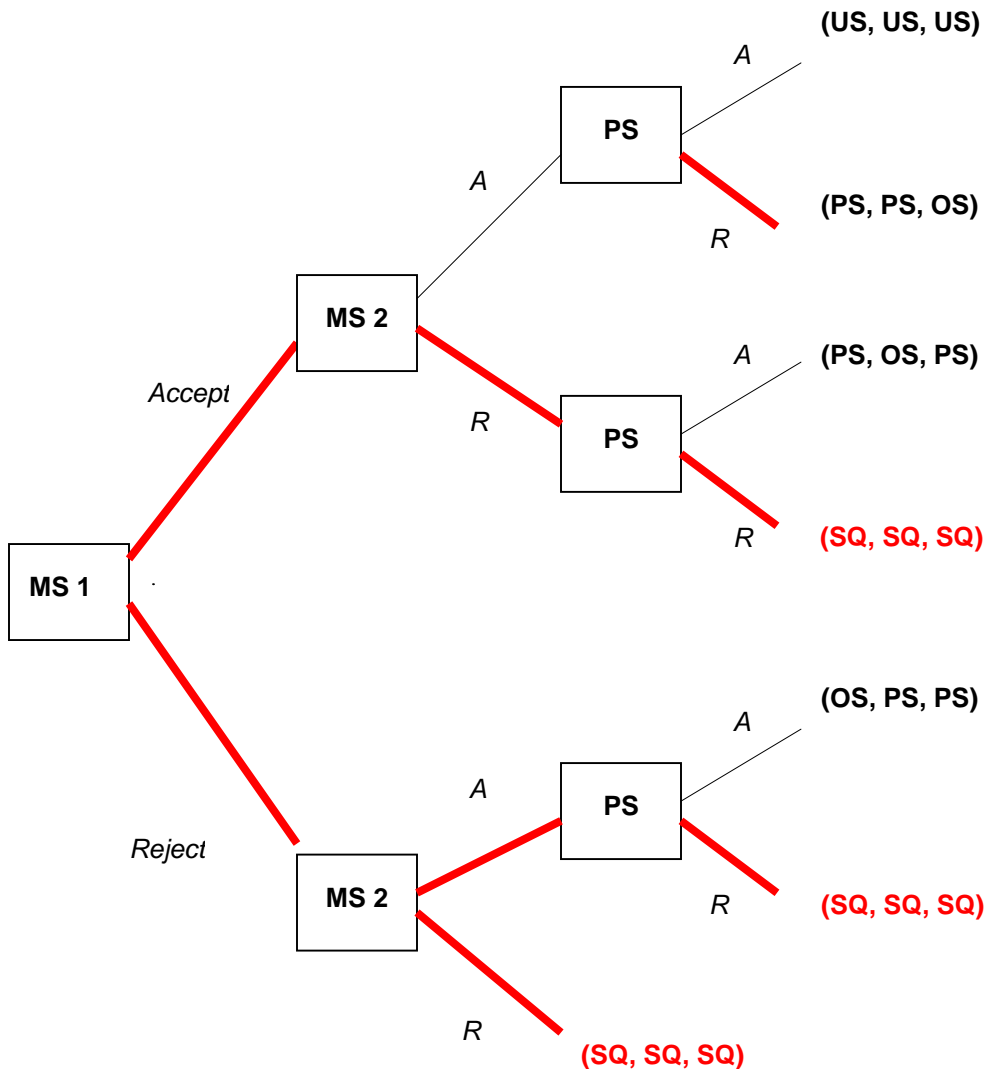
**Picture A 3**

What happens when the market seeking firms expect losses under the common standard, and profit seeking firm anticipates not profits under PS?

Priorities of the firms:

Market seekers (MS 1 and MS 2):  $SQ > OS > PS = US$

Profit Seeker (PS):  $SQ > OS > PS = US$



Equilibrium strategies of the firms:

MS 1: Indifferent (accept or reject)

MS 2: Reject if the first firm accepts and indifferent (accept or reject) if the first firm rejects

PS: Reject, reject, reject

Outcome: Status quo: SQ, SQ, SQ