Offering RSS Feeds: Does It Help to Gain Competitive Advantage?

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Abstract
Nowadays, many websites have adopted the Really Simple Syndication (RSS) technology to deliver online content to visitors. In this paper, I build an analytical model to examine how the offering of RSS feeds impact the number of visitors, total traffic load, and profit of websites in a competitive setting. I show that although RSS can always attract more visitors, it may reduce the website’s profit. Interestingly, in a competitive market there are cases that the RSS feeds hurt the offering website but benefit the competing website instead. The conditions under which these will happen are derived. I also study the simultaneous RSS-adoption game and show that different equilibrium outcomes will appear under different parameter combinations. Applying my findings to the practice, I suggest that offering RSS feeds could become a competitive disadvantage, and that certain types of websites, such as websites providing free content, should not offer RSS feeds.

1. Introduction

The Internet has dramatically changed the quantity and range that information could be spread and exchanged. Nowadays, a tremendous amount of information is accessible to users across the globe via the World Wide Web. It brings on the contingent problem of "information overloading." It is not an easy task for users to find their interested content in face of such an information explosion. To locate useful information, a web user bears costs of searching among and within websites. Meanwhile, during the search, the user also bears costs of downloading and viewing unwanted advertisements such as online banners, pop-ups, and sponsorships. These costs could be significant ([2], [7], [13]). On the other hand, the information explosion also brings difficulties to websites. It becomes much harder for websites to identify and access their target users who are globally distributed, as well as to deliver the online content to these target users in an effective way. Competition among websites becomes more intensive. Competing websites often provide the similar or exactly same content and services, and they are just one-click away. How to distinguish themselves from competitors, attract fresh users and retain existing ones in the Internet is much more challenging than in any other industry.

Really Simple Syndication (RSS) technology has emerged as a solution. It serves as a content delivery mechanism for websites as well as an information aggregator and filter for visitors. Using RSS, a website can “push” their content directly to potential web visitors. In order to do so, the website needs to create RSS feeds attached to its content. The official RSS icon is a square with rounded corners, usually orange, indicating “RSS” or “XML.” Once visitors select their interested feeds, the RSS program starts to work. It collects information from multiple websites, informs the visitor of latest updates periodically, and leads the visitor to the full content simply by clicking the attached link. Painful searching process is skipped; uninterested content and unwanted advertisements are filtered out ([8]).

Websites respond to this new technology enthusiastically. By June 2005, 30% of all consumer media sites have already been providing their content via RSS feeds ([3]). For example, CNN.com offers free RSS feeds in XML format, the so-called “RSS Content,” to its visitors (http://edition.cnn.com/services/rss/). These feeds include news story headlines, summaries and links back to the CNN site for the full article. Yahoo! has added feeds to its customizable My Yahoo! Pages; and Google took steps to follow suit with the introduction of its customizable home page ([10]). Industry data have shown that providing RSS feeds does attract more visitors to a website. According to the New York Times press release, RSS feeds generate 5.9 million page views for their site in March 2005, which represents a 342% increase over the previous year ([14]). News Yahoo! reported that adding RSS feeds into My Yahoo! attracted 26 million additional visitors in April 2005. Intrigued by the increase in the number of page views and visitors, websites are offering RSS feeds at an even faster speed. Feedster, an RSS search engine, claims that the number of RSS feeds carried by
it has skyrocketed to 8.2 million in July 2005 from less than 1 million in November 2004 ([10]).

Despite the rapid adoption of RSS, some important issues remain unsolved. First, although providing RSS feeds seems to attract more visitors, it is still unclear whether such increase in visitors can contribute to a proportional increase in profit. McLaws, Google's RSS advertising pilot, says that in his blog site "98 percent of the traffic originates from the RSS feeds." He complains that the RSS feeds are a bandwidth killer, and he is not able to monetize the site or take care of server costs ([1]). The second question is that as more and more websites are starting to offer RSS feeds, will the adoption still bring competitive advantages for a site? Researchers have shown that there are no absolutes as far as draw-backs and benefits when adopting a new technology or strategy. One example is the software third-party add-ins. Although add-ins enhances the functionality of the base product, it may increase or decrease the profit of the base software producer, depending on how consumers value the add-ins ([4]). Another example is online customization strategy, which could be used as a price discrimination tool for sellers to gain higher profits. However, Dewan, Jing, and Seidmann ([6]) show that in a simultaneous adoption game, the two competing firms face a prisoner's dilemma choice. It is not necessarily optimal to adopt such a strategy in a competitive market. Similarly, the profitability of RSS feeds should also be investigated. Offering RSS feeds creates a new visit channel to web visitors. When the conventional direct visit and RSS visit channels coexist, how would they affect and compete with each other? In literature, channel and product-line cannibalization has been found in many scenarios ([11], [12]). The coexistence of multiple delivery channels or products may have strong cannibalization effects and eventually lead to a lower profit for the provider. In the RSS scenario, will this happen?

In this work, I construct an analytical model to answer these above research questions. I study the impact of RSS adoption for websites in the competitive setting. To my best knowledge, this is the first paper studying the economic aspects of the RSS technology, which contributes to guide the RSS adoption from a novel angle. My analysis shows that offering RSS feeds, though always leading to a higher traffic load, may reduce the adopting website's own profit but increase the competitor's profit. The RSS use hence constitutes a competition disadvantage, rather than advantage. In the paper, I derive the conditions under which it will happen. In addition, I show that the RSS adoption strategy largely depends on the profit structure of websites. For example, websites who offer free content (such as weblogs) or whose revenue mainly comes from advertising (such as most news portals) should not offer RSS, while websites who gain high sales income from visitors’ online consumption (such as e-commerce sites) should adopt the RSS.

The paper is organized as follows. Section 2 describes the model. Section 3 studies the website competition. Then I analyze the impact of RSS adoption on the competition outcome in Section 4, and the adoption equilibrium in Section 5. Section 6 extends the model analysis. The last section 7 summarizes major findings and discusses their business implications.

2. The model

Consider a website providing two types of content: general content and specific content.¹

General content provides web visitors with a brief and comprehensive information summary. Such information is free and easy to locate; in many cases it is posted on the home page. Visitors value general content differently. Some people enjoy browsing websites, and therefore gain higher utility from reading the general content; others are more like “serious” information seekers, who have a strong prior on what they are interested in and thus obtain lower utility from viewing “unrelated” general information. To capture this natural difference of visitor population, I assume that a visitor's value from browsing the general content, denoted by $x$, follows uniform distribution in the range of $[0, a]$: $x \sim U[0, a]$.

Specific content offers detailed information in a specific category or area. In order to access it, a visitor needs to spend time and efforts to search enough pages on the site. Consuming his interested content brings a value $b$ to the visitor; meanwhile, such consumption contributes to the website income. Depending on the website type, the income may take different forms and have different names. For instances, on e-commerce websites, it could be the business profit from a visitor's online product purchase or service consumption; on news portals, which may charge visitors for their access to certain specific content, it is so called the "view-by-pay" charge. Regardless of the website type, it measures a visitor's non-advertising value to the website. In this paper, I use a uniform name “sales income (per visitor)” and denote it by the parameter $p$.

In the traditional way, visitors log on to the website, browse the general content, search through a number of pages, and eventually locate and consume

¹ The ratio of the two types of content could be arbitrary.
the specific content of interests. I call them “direct visitors.”

A direct visitor incurs three types of costs:
1. Searching cost $S$: a direct visitor has to search enough pages on the site before reaching his interested content.
2. Traffic cost $w \rho$: a visitor incurs disutility when the website is busy. He suffers because the heavy traffic could cause problems such as the slower delivery speed of web pages, deteriorated content quality, or even delivery failure. These constitute the traffic cost of a visitor. Traffic cost is increasing in the total traffic load on the website which is denoted by $\rho$, and $w$ is the constant parameter. The calculation of $\rho$ will be discussed in details later.
3. Anti-advertising cost $C_{ad}$: most websites have a variety of online advertisements on them, such as pop-ups and banners. Although advertisements could be effectively used as a way of signaling unobservable product quality to potential customers (Milgrom and Roberts 1986), downloading and viewing advertisements impose extra costs on visitors. They take longer time to load online and require efforts to view (Hoque and Lohes 1999); too many advertisements could even repel visitors (Dewan, Freimer, and Zhang 2002). In the paper, I denote the costs, on the visitors' side, as associated with viewing advertisements by $C_{ad}$, and call it a visitor’s anti-advertising cost.

Hence, I can write the utility function of a direct visitor as $U_D = x + b - p - S - C_{ad} - w \rho$, where the lower subscript $D$ indicates a direct visitor.

If the website provides RSS feeds on its specific content, a visitor may go to the site in a different way. The visitor does not need to search the site to locate this specific content. Instead, he is led to the right location directly by the RSS program. I call him an "RSS visitor." RSS visitors skip browsing general content and only visit the page with specific content. They therefore do not incur searching costs. In addition, the RSS software program works to block online advertisements. Visitors therefore save the costs of downloading and viewing unwanted advertisements. However, they still bear the same amount of traffic costs as direct visitors.

The utility function for an RSS visitor is $U_R = b - p - w \rho$.

Similarly, I use the lower subscript $R$ to indicate an RSS visitor.

The website gains both advertising as well as sales incomes, and bears site maintenance costs. Its profit function takes the following form

$$\pi = A \cdot N_D + p \cdot N - c \cdot \rho$$

I use $N$, $N_D$, and $N_R$ to denote the total number of visitors, the number of direct visitors, and the number of RSS visitors respectively. The total number of visitors ($N$) is the proxy for the market size. The parameter $A$ is the website's unit advertising income (per visitor), $p$ is its unit sales income (per visitor). The first term in equation (1) is the website's total advertising income. Direct visitors ($N_D$) contribute to the advertising income. They, to some extent, are forced to download and view online advertisements when browsing and searching web pages, which increases the probability of gaining advertisement income for the site. However, unlike direct visitors, RSS visitors are not significant contributors to the site’s advertising income because most RSS software can effectively block online advertisements. The second term in equation (1) is the site's sales income. All visitors contribute to this part ($N = N_D + N_R$). The last term is the website's total maintenance costs, which is the marginal maintenance cost $c$ multiplied by the traffic load of the site, $\rho$.

Direct and RSS visitors visit the website in distinct ways, so they impose different traffic loads on the site. Direct visitors search the site and therefore download and visit a number of pages. I normalize the traffic load imposed by one direct visitor to be 1. RSS visitors skip the search process and visit the pages with specific content. They therefore impose less traffic load, which is assumed to be a fraction of $\theta$, $\theta < 1$. Hence, a website’s total traffic load can be decomposed as

$$\rho = N_D + \theta N_R$$

In addition, I make the following assumption: $b - C_{ad} - S - aw \leq p \leq a + b - C_{ad} - S$. If the left inequality is violated, the website will always

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2 It does not matter what type of advertising income a website gains. It could be by per impression or by click-through rate or any other forms. For the modeling purpose, the only thing needed is that the existence of online advertisements does cause disutility for visitors.

3 Note that a visitor will derive different net values depending on which channel he is from ($U_R$ from the RSS channel and $U_D$ from the direct visit).

4 Although there is debate going on that websites should add advertisements into their RSS feeds, the actions are not taken by many websites yet. For example, CNN.com restricts advertisements in RSS. It claims that “the incorporation of advertising into or the placement of advertising associated with or targeted towards the RSS Content, are strictly prohibited.”
attract all potential visitors (a fully-covered market); if the right inequality is violated, the website will get no visitor at all. Both cases are trivial.

3. Competition between websites

Two websites, A and B, compete with each other. They have the same profit structure, given by equation (1). I analyze four cases one by one: Case <0,0>: both websites do not offer RSS feeds; Cases <1,0> and <0,1>: one website offers RSS feeds and the other does not; and Case <1,1>: both websites offer RSS feeds.

3.1. Case <0,0>: both websites do not offer RSS

In Case <0,0>, there is no RSS. In equilibrium, the two websites must have the same traffic load:

\[ \rho_A^{<0,0>} = \rho_B^{<0,0>} \] 5

Otherwise, visitors will switch from the website with higher traffic load to the website with lower traffic load until the equivalence is reached.

\[ \rho = \frac{-b + C_{ad} + p + S + aw}{1 + w/2} \] (4)

\[ \rho_i^{<0,0>} = N_i^{<0,0>} = \frac{(a - x^{<0,0>})/2}{2 + w} \]

\[ i = A, B \] (5)

\[ \pi_i^{<0,0>} = N_i^{<0,0>} (A + p - c) = \frac{(a + M + aw)(A + p - c)}{2 + w} \]

\[ i = A, B \] (6)

3.2. Case <0,1>, <1,0>: one website offers RSS

Without loss of generality, I look at the case <1,0>: website A offers RSS while B does not. Note that although the two websites here are “heterogeneous” in terms of their respective visit channels, the rule of “equal traffic load” still holds in equilibrium. Otherwise, some direct visitors will switch from the site with higher traffic load to the site with lower traffic load until the equivalence is reached.

Potential visitors now have two decisions to make: which website to visit and which visit channel to take. They first make the channel choice, and then the website choice. In other words, the competition between visit channels (RSS or direct visit) precedes the competition between websites (A or B). Denote the visitor who is indifferent between the two channels by \( x^{<0,0>} \), where \( x^{<0,0>} \) indicates this visitor’s value from general content browsing. As in Figure 1(b), visitors in \([0, x^{<0,0>}]\) log to websites A or B directly. Assume that website A captures \( r \) percent of direct visitors and B captures \( 1 - r \) of them. There is no cutting-off interface between A’s direct visitors and B’s. Among those in \([0, x^{<0,0>}]\), there are \( N_R^{<0,0>} \) RSS visitors. They visit website A through an RSS program. The rest \( x^{<0,0>} - N_R^{<0,0>} \) stay out of the market.

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5 In the paper, I will use the upper subscript to indicate the case, and the lower subscript indicates the website (A or B).
In this segment, there are $N_{<1,0>}$ RSS visitors, who visit website A. The rest $(x_{<1,0>} - N_{<1,0>})$ stay out of the market (do not visit any website).

(a – x_{<1,0>}) direct visitors: $r$ percent of them visit website A and $1 - r$ percent of them visit website B.

Figure 1(b). The competition between websites with and without RSS.

Website B has only direct visitors. Its traffic load is $\rho_{B}^{<1,0>} = N_{B}^{<1,0>} = (1 - r)(a - x_{<1,0>})$. Website A attracts $r(a - x_{<1,0>})$ direct visitors and $N_{R}^{<1,0>}$ RSS visitors. Therefore, the traffic load and total number of visitors to A are $\rho_{A}^{<1,0>} = r(a - x_{<1,0>}) + \theta N_{R}^{<1,0>}$, $N_{A}^{<1,0>} = r(a - x_{<1,0>}) + N_{R}^{<1,0>}$, and $\rho_{A}^{<1,0>} < N_{A}^{<1,0>}$.

The following equations (7) – (10) characterize the equilibrium.

$$\begin{align*}
    b - p - w\rho_{A}^{<1,0>} &= x_{<1,0>} + b - p - S - C_{ad} - w\rho_{B}^{<1,0>} \\
    \rho_{A}^{<1,0>} &= r(a - x_{<1,0>}) + \theta N_{R}^{<1,0>} = (1 - r)(a - x_{<1,0>}) = \rho_{B}^{<1,0>} \\
    b - p - w\rho_{A}^{<1,0>} &= 0 \\
    N_{R}^{<1,0>} &> 0
\end{align*}$$

Equation (7) describes the channel competition and defines the indifferent visitor; (8) states the rule of equal traffic load; (9) shows that in equilibrium an RSS visitor gains zero utility; and (10) states that at least some visitors will use the RSS channel.

I solve the above equations (7) – (10), and get:

$$r = 1 - \frac{b - p}{w(a - K)}; \quad x_{<1,0>} = C_{ad} + S = K; \quad N_{R}^{<1,0>} = \frac{K}{\theta} \cdot \frac{-b + p + arw}{w\theta}.$$ (11)

Condition (10) requires that the cost saving from the RSS approach must be high enough to attract some visitors to use the RSS:

$$K > \frac{-b + C_{ad} + p + S + arw}{1 + rw}.$$ (12)

The above inequality (12) is the non-degeneration condition for Case $<1,0>$. When it is violated, Case $<1,0>$ degenerates to Case $<0,0>$. In other words, although the site A offers the RSS channel, due to the small cost savings, no visitor will take it.

**Lemma 1** In the competition between a website with RSS (website A) and without RSS (website B), $N_{A}^{<1,0>} \geq \rho_{A}^{<1,0>} = \rho_{B}^{<1,0>} = N_{R}^{<1,0>} = N_{D,B}^{<1,0>} \geq N_{D,A}^{<1,0>} > 0$.

The first and last equalities hold if and only if degeneration happens, namely,

$$K \leq \frac{-b + C_{ad} + p + S + arw}{1 + rw}.$$ (13)

Note that the same level of traffic load can "hold" more RSS visitors than direct visitors because each RSS visitor contributes to the traffic load by $\theta < 1$.

Hence, the rule of equal traffic load means that website A (with RSS) has a larger number of visitors than website B (without RSS). In addition, from equation (8), it is easy to see $r < \frac{1}{2}$, which means that website B serves the majority of direct visitors. Based on these observations, I can further conclude that the RSS adopter may or may not gain higher profit in the competition with a non-adopter.

**Proposition 1** In the competition between a website with RSS and without RSS, there is a threshold value $p^{<1,0>}$ such that when the sales income per visitor $p > p^{<1,0>}$ the website with RSS gains higher profit. Otherwise, the website without RSS gains higher profit. This threshold value $p^{<1,0>}$ is the smaller positive root of the following equation:

$$p = \frac{(2r - 1)(a - K)A}{(2r - 1)(a - K) + rK\theta + (b - p)}.$$ (14)

3.3. Case $<1,1>$: both websites offer RSS

The equilibrium market segmentation is shown in Figure 1(c). The visitor $x_{<1,1>}$ is indifferent between the two visit channels. All visitors in $[x_{<1,1>}, a]$ are direct visitors, among which $r_{1}$ percent of them go to website A and $1 - r_{1}$ percent go to website B. There is no cutting-off interface between A's direct visitors and B's. In the interval of $[0, x_{<1,1>}]$, there are in total $N_{R}^{<1,1>}$ RSS visitors and the rest $(x_{<1,1>} - N_{R}^{<1,1>})$ stay out of the market. These RSS visitors are “shared” by both websites: $r_{2}$ percent of them go to website A and $1 - r_{2}$ percent go to B.
In this segment, there are \( N^{cl,b}_R \) RSS visitors, among which \( r_2 \) percent visit website A and \((1 - r_2)\) percent visit website B. The rest \((x^{cl,b} - N^{cl,b}_R)\) stay out of the market (do not visit the website).

\[
\begin{align*}
0 & \quad x^{cl,b} \quad a \\
\text{Visitors’ value from browsing general content}
\end{align*}
\]

In this segment, there are \((a - x^{cl,b})\) direct visitors: \( r_1 \) percent of them visit website A and \(1 - r_1\) percent of them visit website B.

Figure 1(c). The competition with RSS

Following equations characterize the equilibrium. Equation (13) describes the rule of equal traffic load; equation (14) defines the indifferent visitor \(x^{cl,b}\); equation (15) shows that an RSS visitor gains zero utility in equilibrium; and equation (16) is the non-degeneration condition for Case \(<1,1>\).

\[
\begin{align*}
\rho^{cl,b}_i = & r_i(a - x^{cl,b}) + r_i \theta N^{cl,b}_R, \\
& (1 - r_i)(a - x^{cl,b}) + (1 - r_i) \theta N^{cl,b}_R = \rho^{cl,b}_i, \\
b - p - w \rho^{cl,b}_i = & x^{cl,b} + b - p - S - C_A - w \rho^{cl,b}_i, \\
i = & A, B \\
b - p - w \rho^{cl,b}_i = & 0, \; i = A, B \\
N^{cl,b}_R > & 0
\end{align*}
\]

Solving these equations, I get:

\[
\begin{align*}
x^{cl,b} = & K; \\
N^{cl,b}_R = & \frac{K}{\theta} - \frac{-2b + 2p + aw}{w \theta}; \\
\rho^{cl,b}_A = & \frac{b - p}{w}; \\
K > & \frac{-b + C_{ad} + p + S + aw/2}{1 + w/2}
\end{align*}
\]

Asymmetric equilibriums could exist as long as \( r_1 \) and \( r_2 \) satisfy the relation of

\[
(2r_1 - 1)(a - K) = (1 - 2r_2)(K - \frac{-2b + 2p + aw}{w}).
\]

This relation equation implies that \( r_1 > \frac{1}{2} \leftrightarrow r_2 < \frac{1}{2} \)

and vice versa. Obviously, \( r_1 = r_2 = \frac{1}{2} \) satisfies this equation and gives out the symmetric equilibrium. The set of solutions derived here works for both asymmetric and symmetric equilibriums. Equation (18) is the non-degeneration condition for Case \(<1,1>\).

Each website’s profit is given by

\[
\pi^{cl,b}_i = N_{D_{ij}}^{cl,b} A + N_i^{cl,b} p - \rho_i^{cl,b} C, \quad \text{where}
\]

\( N_{D_{ij}}^{cl,b} \), \( N_i^{cl,b} \), and \( \rho_i^{cl,b} \) are the number of direct visitors, the total number of visitors, and the traffic load of site \( i \) respectively, \( i = A, B \). In the symmetric equilibrium outcome, the profit can be further expressed as

\[
\pi^{cl,b}_i = \frac{1}{2}[(a - k)A + \frac{w(\theta - 1)(a - k) + 2b + 2p}{2\theta}] - \frac{(b - p)}{w} K, \\
i = A, B.
\]

4. The impact of the RSS adoption

Consider the two scenarios described below.

(1) Initially, neither website have RSS. Website A adopts the RSS and becomes the first adopter of this new web technology. I call this “the first adoption” of the RSS.

(2) One website has RSS already. Without loss of generality, I assume it is website A. Now website B also offers RSS feeds and becomes the second adopter. I call this “the second adoption” of the RSS.

In this section, I use my results from section 3 to examine how a website’s RSS adoption (the first and second adoption respectively) impacts the competition outcome. I focus on the non-degeneration case only, i.e., when conditions (12) and (18) hold.

My findings are summarized in Table 1. I show that the first adoption of RSS increases the traffic load for both the adopter and its competitor; while the second adoption has no impact on either website’s traffic load at all. It is because the channel competition always precedes the website competition. Potential visitors will first choose the visit channel (RSS or direct); given the channel choice, they choose a website to visit. So in visitors’ eyes, it does not matter which website or how many websites are offering the RSS feeds.

As for the changes in the number of total and direct visitors, the results are intuitive. The first adoption of RSS increases the market size for both websites but the second adoption only increases the adopter’s market size. The RSS adoption, both first and second, always decreases (increases) the number of direct visitors of the adopting (competing) website.
Table 1. Impacts of the RSS adoption

<table>
<thead>
<tr>
<th></th>
<th>$\rho$</th>
<th>$N$</th>
<th>$N_D$</th>
<th>$\pi$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First adoption</strong></td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>+ or -</td>
</tr>
<tr>
<td><strong>Second adoption</strong></td>
<td>none</td>
<td>none</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

Note: The sign “+” indicates an increase and “-” indicates a decrease; and “none” indicates no change.

When studying websites’ profit changes, I notice that there is no definite answer: the profit of the adopter and its competitor may increase or decrease. This interesting finding is investigated further. I identify the concrete conditions under which the profit will increase/decrease for each website. They are stated in Proposition 2.

**Proposition 2.** (1) The first RSS adoption will increase the adopting website’s profit only if the sales income per visitor exceeds a threshold value $P_1^*$, i.e., $p \geq P_1^*$; otherwise, the profit of the adopting website decreases. On the other hand, the first RSS adoption may increase or decrease the competing website’s profit.

(2) The second RSS adoption will increase the adopting website’s profit only if the sales income per visitor exceeds a threshold value $P_2^*$, i.e., $p \geq P_2^*$; otherwise, the profit of the adopting website decreases. On the other hand, the second RSS adoption will always increase the competing website’s profit.

The conclusion drawn here is interesting: in a competitive setting, adopting the RSS technology, no matter as the first mover or the second follower, may not be a profitable action. I identify two threshold values, $P_1^*$ and $P_2^*$. Whether a website’s RSS adoption behavior will benefit or hurt itself depends on whether the sales income per visitor exceeds the threshold value. In specific, I reveal the possibility that the RSS could decrease the adopter’s profit but increase its competitor’s profit (for example, when it is the second adoption and $p < P_2^*$). In such cases, the beneficiary of the new technology adoption is the website’s competitor but not itself.

The below corollary describes the special case $p = 0$. It states that a website offering free content should not offer RSS no matter what the competitor’s choice is.

**Corollary 1.** When $p = 0$, offering RSS feeds will always decrease the adopting website’s profit but increase the competing website’s profit, i.e., $\pi_B^{c,0} > \pi_i^{c,0} > \pi_i^{c,1} > \pi_A^{c,0}$, $i = A, B$.

5. The equilibrium in the adoption game

In this section, I study the Nash equilibrium in a simultaneous RSS adoption game. Before presenting my main findings, I first derive the following Lemma.

**Lemma 2**. There is a threshold value for the website’s unit maintenance cost $c^*$ such that when $c \leq c^*$, $P_1^* \leq P_2^*$ and when $c > c^*$, $P_1^* > P_2^*$.

Recall that $P_1^*$ and $P_2^*$ are the two critical values in Proposition 2. Lemma 2 determines their order. Using Lemma 2, now I can identify all the possible equilibriums. I use “0” to denote the strategy of not adopting, and “1” the strategy of adopting. Hence, the outcome (0,0) means no website adopts, (1,1) means both websites adopt, and (0,1) and (1,0) means one website adopts.

**Proposition 3.** Multiple types of equilibriums exist in the simultaneous adoption game, depending on two parameters, website’s unit maintenance cost $c$ and unit sales income $p$.

- (a) $c \leq c^*$, $p \leq P_1^*$: the unique equilibrium is (0,0).
- (b) $c \leq c^*$, $P_1^* \leq p < P_2^*$: both (1,0) and (0,1) are equilibrium outcomes.
- (c) $c \leq c^*$, $p \geq P_2^*$: the unique equilibrium is (1,1).
- (d) $c > c^*$, $p \leq P_2^*$: the unique equilibrium is (0,0).
- (e) $c > c^*$, $P_2^* \leq p < P_1^*$: both (0,0) and (1,1) are equilibrium outcomes.
- (f) $c > c^*$, $p \geq P_1^*$: the unique equilibrium is (1,1).
Figure 2: The RSS adoption equilibriums

Figure 2 shows these Nash equilibriums. Two important factors are identified. The first is $p$. When $p$ increases, website's incentive to adopt the RSS increases. Under a large value of $p$, it is more likely to get the $(1,1)$ equilibrium, namely, both websites adopt; while under a small value of $p$, the $(0,0)$ equilibrium, namely, none adopts, should be expected. This finding could be applied to the practice. For example, consider weblog sites, where the RSS originally rooted from. RSS naturally becomes the major tool for these sites to distribute contents because of their narrow information coverage and unstable update periods. However, my finding here shows that from the economic perspective, weblogs should not adopt RSS. These sites usually provide free content and hence are likely to lie in the category of low sales income, regions (a) or (d) in Figure 2. Offering RSS feeds will lead to a profit reduction for them. This conclusion is consistent with current online practice that there is an increasing number of complaints from weblogs that their RSS feeds attract too much traffic load and make it difficult to monetize the sites. The reason that weblogs currently still take a significant RSS provision percentage is that most of these sites do not take profitability as their major goal. Another example is e-commerce websites, which are likely to be in the regions of high sales income, (c) and (f). These sites gain revenue mainly from selling commodities or providing online services to visitors. To them, more visitors mean greater profitability. Although the RSS has only been recognized by the e-commerce sites in the recent years, the finding here predicts that the wide adoption of the RSS technology by e-commerce sites will be put in practice soon.

The second factor that affects the equilibrium type is the unit maintenance cost $c$. As $c$ increases, website’s incentive to adopt RSS reduces. It is more likely to see the none-adoption equilibrium $(0,0)$ to appear. The underlying reason is that the RSS will always bring websites more traffic, leading to higher total maintenance costs. So a large $c$ potentially becomes an obstacle for the RSS adoption. On the other hand, as $c$ decreases, the two competing websites could show differentiations in their adoption strategies. Single-adopting, $(1,0)$ or $(0,1)$, becomes a possible equilibrium outcome only if $c$ drops below the certain level $c^*$. This finding predicts that as the technology keeps improving to reduce the unit maintenance cost we would expect to see websites become more diversified in the RSS adoption decision.

Corollary 2 When $p = 0$, the Nash equilibrium is always $(0,0)$.

This corollary directly follows from Proposition 3.

6. Adding advertisements to RSS feeds

In this session, I examine the effects of adding advertisements into RSS feeds. When RSS visitors also contribute to the website advertisement revenue, how would my major results change?

So far, my analyses are under the assumption that the RSS is able to block online advertisements and so RSS visitors do not bear the anti-advertising costs $C_{ad}$ as direct visitors do. The consequences are: first, potential visitors have strong incentive to use the RSS channel since the decision of using the RSS or not is determined by whether the cost savings ($K$) from the RSS is large enough; second, websites’ profit is reduced since RSS visitors do not contribute to the advertising revenue, which causes severe problems especially for websites which are largely monetized by advertisements. If I remove this assumption, it means that RSS visitors will also be exposed to a certain amount of advertisements and they could contribute to the advertising revenue by a factor $0 \leq \delta \leq 1$, where $\delta = 0$ is the case that all advertisements are blocked by RSS and $\delta = 1$ is the extreme case that the RSS cannot block any advertisements. After redoing all the analyses, I find that the only change of my results is that now the expression of cost savings from RSS need be revised as $K = S + (1-\delta)C_{ad}$. Once this revision is done, all other solutions and equations remain the same. So are lemmas and propositions.

In addition, the new analysis enables me to derive the largest quantity of advertisements that could be added into the RSS feeds. Consider the non-degeneration conditions obtained in the paper, i.e., inequalities (12) and (18) for cases $<1,0>$ and $<1,1>$ respectively. Because the total saving $K$ reduces after adding advertisements, the left parts of these
inequalities become smaller while the right parts keep unchanged. So these inequalities are more likely to be violated. Degeneration is more likely to happen when more advertisements are added into the RSS. Studying the binding conditions of these inequalities, I obtain an upper bound of \( \delta \), denoted by \( \delta^* \), meaning that if too many advertisements are added into the RSS feeds, beyond this upper bound, no potential visitors will use the RSS, i.e., degeneration happens. For each case, such upper bound value is derived.

**Proposition 4.** Advertisement could be added to the RSS but with an upper limit on its quantity. The maximum amount of advertisements, denoted by \( \delta^* \), is given below. If it is exceeded, no visitors will use the RSS program to visit the website.

\[
\delta^* = \begin{cases} 
\frac{b - p + wr(S + C_{ad} - a)}{(1 + wr)C_{ad}} & \text{Case } <1,0> \\
2b - 2p + w(S + C_{ad} - a) & \text{Case } <1,1>
\end{cases}
\]

To read this result, note that an average direct visitor will read one unit of online advertisement. Proposition 4 states that for a website that is competing with another website without RSS, it should load no more than \( \frac{b - p + wr(S + C_{ad} - a)}{(1 + wr)C_{ad}} \) unit of advertisements into its RSS feeds. This upper bound becomes \( \frac{2b - 2p + w(S + C_{ad} - a)}{(2 + w)C_{ad}} \) for a website that is competing with another website with RSS. These numbers could provide useful guidance for website decision makers at a qualitative level.

**7. Conclusion**

In this paper I propose a model to study the profitability and competitive (dis)advantage of the RSS adoption for websites. The model looks at the website with revenue coming from two sources: advertising and providing online products/services. Meanwhile, the website bears maintenance costs which are increasing in the total traffic load on the site. The online information offered by the website is valuable to potential visitors. However, visitors’ willingness-to-pay for accessing such information is heterogeneous across the whole population. The conventional way of the website visit imposes various types of costs on the visitor, including searching, anti-advertising, and traffic costs. On the other hand, if the visitor could use the RSS to access the online information, it can be relieved of some of these costs. My study finds several interesting results and offers insightful practical implications. They are briefly discussed below.

First of all, I identify the situations when higher traffic load brought on by the RSS is accompanied by lower profit. This could happen when the revenue increments from the higher traffic load are not enough to offset the maintenance cost increases. More interestingly, I find that the RSS adoption of one website could improve its competitor’s profit but reduce the profit of itself. This is because direct visitors are, in general, more profitable customers than RSS visitors due to their larger contribution to the site’s revenue. When a website opens the RSS channel and attracts a large amount of RSS visitors, it results in high traffic load and drives direct visitors away to the competitor, which in turn benefits the competing website. I derive the conditions under which it will happen, and suggest that in such a case, the beneficiary of the new technology adoption is not the adopter but its competitor. So the RSS adoption constitutes a competition disadvantage, rather than advantage. This important finding offers explanations to the recent complaints from some websites that after offering RSS feeds they have difficulty to handle the heavy traffic and are not able to monetize their sites ([1]). It also gives out some “warnings” to websites that are considering RSS adoptions. The RSS is not a costless content-delivery mechanism. A careful cost-and-benefit analysis is needed when making the adoption decision. Certain types of websites, for example, websites who offer free online content (such as weblogs) or whose revenue is mainly from advertising (such as new portals) should not offer the RSS feeds. To them, the RSS use, though facilitating the information delivery to visitors, cannot be justified from an economics point of view.

In studying the simultaneous adoption game for two competing websites, I find that there are three types of adoption outcome, namely, both websites adopt, one website adopts only, and none adopts, may appear depending on two key parameters: the expected sales income per visitor (\( p \)) and the unit website maintenance cost (\( c \)). In specific, the equilibrium “both adopt” is more likely to appear as \( p \) increases or as \( c \) decreases; while the equilibrium “no website adopts” is more likely to appear as \( p \) decreases or as \( c \) increases. These results could be applied to the reality for analyzing the future trend of RSS adoptions. For example, the finding that websites tend to adopt RSS under a higher value of \( p \) suggests that e-commerce websites benefit from the RSS use to a large extent. A large proportion of the revenue of e-commerce websites is from selling commodities or providing online services to their visitors. They earn
high unit sales income per visitor. Although the RSS has only been recognized by these sites recently, my analysis here predicts the wide adoption of the RSS technology by e-commerce sites in the near future.

References


