Content provision and compatibility in a platform market

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Competition economics

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1. Introduction

**Big picture (Incompatibility)**

Content providers → Platform: I-tunes → Users 1

Content providers → Platform: Android → Users 2
1. Introduction

Big picture (Compatibility)

Content providers

Platform: Android

Platform: I-tunes

Users 1

Users 2
1. Introduction (In detail)

**Problems**

- Compatibility is an important aspect reflected in so-called standard wars
- E.g. VHS/betamax, Bluray/HD DVD
- However, it has only received relatively little attention in the literature so far

**So, In this paper**

- The question is addressed
- Whether platforms’ compatibility choices and socially beneficial decisions can actually be aligned
2. The model

- **Platforms**
  - By utilizing Hotelling model
  - Platform generate income from both Users **price** and CP **license fee**
  - Marginal costs and fixed cost are normalized to zero

- **Users**
  - Users of mass one only buy from one of the two platforms
  - Users are distributed uniformly along the unit interval
    - $u_1 = v + \theta n_1 - p_1 - \tau x$  
    - $u_2 = v + \theta n_2 - p_2 - \tau (1 - x)$  
    - If users use Platform 1
    - If users use Platform 2
  - $s_i = \frac{1}{2} + \frac{\theta(n_i - n_j) - p_i + p_j}{2\tau}$  
    - **(1)** Marginal Users

- **Content providers**
  - $\pi = \phi s_i - l_i - f$
  - $\pi \geq 0 \iff f < \phi s_i - l_i = n_i$  
    - **(2)**

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**Notations Description**

<table>
<thead>
<tr>
<th>Notations</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>$v$</td>
<td>The basic valuation (Users platform preference)</td>
</tr>
<tr>
<td>$\theta$</td>
<td>Benefit from an extra unit of platform</td>
</tr>
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<td>$p_i$</td>
<td>Price of contents</td>
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<td>$\tau$</td>
<td>Transportation Cost</td>
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<tr>
<td>$\phi$</td>
<td>Benefit from each user</td>
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<tr>
<td>$s_i$</td>
<td>The number of users at platform $i$</td>
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<td>$l_i$</td>
<td>License fee</td>
</tr>
<tr>
<td>$f$</td>
<td>Investment cost</td>
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3. Analysis

**Incompatibility:** Content produced on one platform cannot be accessed by users of the rival platform

- Eqs, (1), (2) $s_i, n_i$
- $\Pi_i = s_i p_i + n_i l_i$
- From the FOC

\[
\begin{align*}
  p^* &= \tau - \frac{3\theta \phi + \phi^2}{4} \\
  l^* &= \frac{\phi - \theta}{4} \\
  n^* &= \frac{\phi + \theta}{4} \\
  \Pi^* &= \frac{\tau}{2} - \frac{\phi^2}{16} - \frac{\theta^2}{16} - \frac{3\theta\phi}{8}
\end{align*}
\]

**Compatibility:** The two platforms agree on a common standard

\[
\begin{align*}
  p^{**} &= \tau \\
  l^{**} &= 0 \\
  n^{**} &= \phi \\
  \Pi^{**} &= \frac{\tau}{2} - F
\end{align*}
\]
3. Analysis (Comparison)

User welfare (In respect to content price and access content)

- User price are higher under compatibility ($p^{**}$) than under incompatibility ($p^*$)
- Under compatibility, larger market size ($n^{**} \& n^*$) is available for content providers
- License fee is affected by introducing compatibility, This effect may go either way
- In total, all impact depends on the strength of the market size and license effect

Lemma 1. Compatibility decreases content provision if $n^{**} < n^* \iff 3\phi < \theta$
and increases content provision otherwise.

Proposition 1. User surplus decreases due to compatibility.

- Neglecting any constants, user surplus is $CS = \theta n - p$

\[
CS^* = \frac{1}{4} (\phi^2 + \theta^2) + \theta \phi - \tau \quad \quad \quad \quad \quad \quad CS^{**} = \theta \phi - \tau
\]
3. Analysis (Comparison)

- Platforms agree on compatibility if it lead to higher profit

$$F < \frac{\phi^2}{16} + \frac{\theta^2}{16} + \frac{3\theta\phi}{8} =: F_p$$

- Total welfare with and without compatibility is given by

$$w^* = \frac{3(\phi + \theta)^2}{16} \quad \quad \quad w^{**} = \frac{\phi^2}{2} + \phi\theta - 2F$$

Compatibility is desirable for society only if

$$F < \frac{5\phi^2}{32} - \frac{3\theta^2}{32} + \frac{5\theta\phi}{16} =: F_s$$

Proposition 2. Compatibility is excessive (insufficient) if $$\phi > \frac{5\theta}{3}$$, $$(\phi < \frac{5\theta}{3})$$

- The result follows from $$F_p > F_s, F_p < F_s$$
4. Conclusions

- Compatibility leads to higher prices.
- Compatibility increases developers’ incentives to create content for a larger user base.
- Compatibility may result in higher or lower license fees, i.e., content may go down or up.
- Compatibility may be particularly harmful if the scope of content is reduced.
- Compatibility may be beneficial if content is sufficiently increased.
Q&A

THANK YOU 😊