The Problem of Movie Piracy

No Meaningful Impact?
The Effect of Pre-Release Movie Piracy on Box-Office Sales

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Expert Address
Room 613, United Centre, Admiralty, HK

Outline

• Understanding Movie Piracy
• Piracy: Industry and Academic Perspectives
• Promotional potential for piracy?
• Conclusions

Pre-Release Piracy: Studio’s Response

• Pirated copies of Lions Gate Entertainment Corp's horror sequel “Hostel: Part II” appeared a month before theatrical release on 8 June 2008

• In response, Lion Gate’s President Tom Ortenberg said “It's distressing and disappointing, but it will have no meaningful impact on the box office.”
"However, piracy has become worse than ever now, and a stolen workprint (with unfinished music, no sound effects, and no VFX) leaked out on line before the release, and is really hurting us, especially internationally. Piracy will be the death of the film industry, as it killed the music industry, and while it makes a smaller dent in huge movies like Spider-man 3, it really hurts films like mine, which have far less of an advertising and production budget. Not only that, critics have actually been REVIEWING the film based off the pirated copy, which is inexcusable. Some of these critics I have actually known for a few years, and while I wouldn't dignify them by mentioning them by name, I know who they are, as do the studios, and other filmmakers, and they will no longer have any access to any of my films."

Director Eli Roth  (MySpace blog)
Movie Piracy will Increase

- The initial emphasis has been on music piracy
  - Small download sizes amenable to download via dialup
- However these factors mean movie piracy will grow:
  - Increasing network bandwidth
  - Continuing growth in Internet penetration of consumer markets
  - Merger of media, television, and personal computing

Proposed Solutions

- Security: Metal detectors, Camcording felony law
- Technological: Watermarking
- Managerial: Limit promotional distribution
- Legal: Lawsuits against movie pirates
- Policy: IP Policy Tsar

US Government shut down nine sites on 30 June 2010

The Questions

How much does pre-release movie piracy harm box office revenue?

How does this vary over movie lifecycle?

How does this vary by piracy quality?
Piracy

Industry and Academic Perspectives

Industry Arguments against Piracy

- Companies now have to “compete” against pirated copies of their own IP
- Will produce less and reduce investments
- Loss of tax revenues and jobs

BSA/IDC Economic Impact Study (2005) found 10% decrease in worldwide piracy rate over 4 years would:
  - Add 1.5 million new jobs, $64b in taxes and $400b in economic growth
  - Yield larger benefit for countries with higher piracy rates

Movie versus Music Sales

<table>
<thead>
<tr>
<th>Year</th>
<th>Movie Sales</th>
<th>Music Sales</th>
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<tbody>
<tr>
<td>1990</td>
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<tr>
<td>1995</td>
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<td>2000</td>
<td>$12,000.00</td>
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<td>2005</td>
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<td>2010</td>
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Movie versus Music Sales: Per Capita

<table>
<thead>
<tr>
<th>Year</th>
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<th>Music Per Capita</th>
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<tbody>
<tr>
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<tr>
<td>2010</td>
<td>$15.00</td>
<td>$20.00</td>
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</table>
**Literature: Effects of Piracy**

- Impact of Piracy on Music Demand
- Impact of Piracy on Video Demand
  - Piracy reduces demand for DVDs (Rob and Waldfogel 2007) and theatrical revenue (Danaher and Waldfogel 2008)
  - No impact on catalog DVD sales (Smith and Telang 2009)
  - Digital distribution substitute for piracy (Danaher et al. 2009)
  - Piracy hurts “bad” movies (Chellappa and Shivendu 2005)
- Impact of Piracy on Software Demand
  - Pirates may subsequently purchase (Chellappa et al. 2006)

**Literature: Modeling Movie Box Office**

- What drives box office success?
  - Script (Eliashberg et al. 2007)
  - Advertising (Rennhoff and Wilber 2008)
  - Stars (Elberse 2007)
  - Distribution (Swami et al. 1999)
  - Critics’ reviews (Eliashberg and Shugan 1997)
  - User reviews (Dellarocas et al. 2007, Duan et al. 2008)
- Consumer heterogeneity / product differentiation (Eaton and Lipsey 1989)
  - Most (all?) piracy papers in environment with both (low quality?) piracy and (high quality?) legitimate product
Theory: Impact?

Substitution

“During 2007, the entertainment industry generated a trade surplus of $13.6 billion, imagine what those numbers would be if we could reign in piracy.” Rep. Howard Berman, Chairman, House Committee on Foreign Affairs.

Word of Mouth

“If people see this movie and don’t like it, and they tell their friends, and their friends blog about it, and it just spreads throughout the blogosphere, there are a lot of people that don’t even get near a pirated copy of this film, who don’t go to see [the movie in theaters] because of this leak” Steve Zeitichik, The Hollywood Reporter, discussing Wolverine Leak.

Hypotheses

- H1: Pre-release piracy reduces movie box-office sales.
- H2: Pre-release piracy has a higher impact on earlier periods of movie-box office sales than later periods.
- H3: Higher quality pre-release piracy has a lower impact on box-office sales than lower quality leaks do.

Empirical Model

  - where...

  \[ BO_{it} = m_{it}e^{-\lambda_{it}+\xi_{it}} = e^{\log m_{it}-\lambda_{it}+\xi_{it}} \]

  \[ \lambda_{it} = Z_{it}Y_{it} + \xi_{it} \]

  \[ \log m_{it} = X_{it}\beta_{i} + \xi_{it} \]

  - where...

  \[ BO_{it} = m_{it}e^{-\lambda_{it}+\xi_{it}} = e^{\log m_{it}-\lambda_{it}+\xi_{it}} \]

  \[ \lambda_{it} = Z_{it}Y_{it} + \tau P\bar{y}_{it} + \xi_{it} \]

  \[ \log m_{it} = X_{it}\beta_{i} + P\bar{y}_{it} + \xi_{it} \]
**Data: Movie Characteristics**

- All movies released Jan 2006 - Jan 2009
- **IMDB:** budget, star appeal, user rating, release date (USA)
- **BoxOfficeMojo:** weekly box office, distributor, genre, MPAA rating, director appeal, screens,
- **Yahoo Movies:** critic rating

**Data: Piracy/Quality**

- Pre-release piracy:
  - 1 if available before US theatrical release
- **Audio Quality:** Avg. audio quality from vcdq
- **Video Quality:** Avg. video quality from vcdq
Final Dataset

• 194 movies, 21 with pre-release piracy

Results:

Homogeneous Decay

\[ \log BO_0 = X_0 \beta_0 - \lambda t + \rho P_{\text{Piracy}} - \tau P_{\text{Piracy}} + u + v \]

- \( \rho < 0 \) → total revenue loss = 18.2%
- \( \tau < 0 \) → faster decay

Results:

Heterogeneous Decay

\[ \log BO_0 = X_0 \beta_0 - \lambda t + \rho P_{\text{Piracy}} - \tau P_{\text{Piracy}} + u + v \]

- \( \rho < 0 \) lower market potential (-14.8%)
- \( \tau < 0 \) → faster decay

Results:

Piracy Quality

\[ \log BO_0 = X_0 \beta_0 - \lambda t + \rho P_{\text{Piracy}} + \rho_2 P_{\text{Piracy}}^2 - \tau P_{\text{Piracy}} - \tau_2 P_{\text{Piracy}}^2 + u + v \]

- \( \rho_2 > 0 \) → higher quality piracy, relatively higher market potential
- \( \tau_2 = 0 \) → no difference in decay rate
Endogeneity

- Propensity score matching, re-estimation on matched data
  - Specification 1: Production budget, number of screens predict piracy
  - Specification 2: Production budget, star & director appeal predict piracy

Results

<table>
<thead>
<tr>
<th>Table 6: Propensity Score Matching - Fixed Rate</th>
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<tbody>
<tr>
<td>Selection Criteria: Budget + Screen</td>
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<td>Parameter</td>
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<th>Table 7: Propensity Score Matching - Variable Rate</th>
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<th>Table 8: Propensity Score Matching - Fixed Rate</th>
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<tbody>
<tr>
<td>Selection Criteria: Budget + Star + Director Appeal</td>
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Conjecture

- Our results suggest that pre-release piracy reduces sales. However, the magnitude suggests that under the right conditions positive promotional effects could offset negative effects of cannibalization.
- Develop a Markovian model with diffusion element to model movie sales.
Low Quality/Low WOM

Low Quality/High WOM

High Quality/Low WOM

High Quality/High WOM
Findings

Under the right conditions movie piracy could be beneficial:
1. The underlying quality of the movie is high
2. The quality of the movie is not well signaled through traditional promotions
3. Viewing of the movie is not greatly diminished by viewers of the pirated copy
4. Word-of-mouth effects are strong

Conclusions

Summary

- Pre-release piracy associated with...
  - 14% lower box office
  - Harm disproportionately on opening weeks
- Higher quality pre-release piracy associated with lower decline in box office than other pre-release piracy

Limitations & Future Work

- No data on intensity of pre-release piracy
- Unable to disentangle substitution and word-of-mouth effects
- Small dataset make it difficult to separate effects across genres, etc.