

# Assessing the Impact of Piracy on Movie Revenues: A Tale of the Long Tail?

Christian Peukert  
LMU Munich\*

Jörg Claussen  
CBS†

Tobias Kretschmer  
LMU Munich‡

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## Abstract

In this project we make use of a natural experiment in the market for illegal downloading to study movie box office revenues. Exogenous variation comes from the unexpected shutdown of the popular file hosting platform Megaupload.com in early 2012. The estimation strategy is based on a quasi difference-in-differences approach. We compare box office revenues before and after the shutdown to a matched control group of movies unaffected by the shutdown.

Preliminary results suggest that box office revenues are lower after Megaupload had disappeared, yet the effect is insignificant. When we control for heterogeneity, we can show that blockbusters did benefit from the shutdown, while small to average films did not. This may lend support to the argument that piracy helps to reduce uncertainty about product quality for consumers with high willingness to pay. This word-of-mouth effect seems to be especially important for smaller films with lower marketing budgets.

We propose to further strengthen the empirical identification using additional data. One way is to gather individual-level data to test the theoretical mechanism more directly. Second, we aim to further investigate alternative explanations, such as poor availability of smaller movies on Megaupload.com or quick substitution to other legal and illegal online services. This requires the purchase of movie-level data from commercial providers.

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\*PhD Student, LMU Munich, Munich School of Management, Institute for Strategy, Technology and Organization, c.peukert@lmu.de. Corresponding author.

†Post-Doc, Copenhagen Business School, Department of Innovation and Organizational Economics, jcl.ino@cbs.dk.

‡LMU Munich, Munich School of Management, Institute for Strategy, Technology and Organization, t.kretschmer@lmu.de.

## 1 Existing Literature

The effects of illegal downloading of digital content (piracy) are vividly discussed in the digitization literature (Waldfogel, 2012; Greenstein et al., 2010). Theorists have looked at the phenomenon from several perspectives (Peitz and Waelbroeck, 2006a). Some work finds that firm revenues decrease due to copying which in turn leads to lower incentives to invest in quality in the long run (Bae and Choi, 2006). Other authors suggest that piracy may actually benefit firms. Takeyama (1994) shows that unpaid copying may help firms reach critical mass in network markets more quickly. Others have looked at how illegal copying may help consumers make informed purchase decisions by allowing to find a better match to their tastes. This is the ‘sampling’ effect (Peitz and Waelbroeck, 2006b). Relatedly, Zhang (2002), Gopal et al. (2006) and Alcalá and González-Maestre (2010) offer a more nuanced perspective. Unpaid copying lowers information costs of consumers which then increases the market share of niche products.

According to a recent survey by Smith and Telang (2012), the results of the empirical literature are also mixed. However, most papers find that piracy negatively impacts sales of media products. For example, Danaher and Waldfogel (2012) look at the theatrical release lag of the top ten movies in several countries relative to the US and find that longer release lags lead to lower revenues. The effect is stronger in years in which BitTorrent was available. Research has shown the importance of the long tail phenomenon in entertainment markets (Zentner et al., 2012), and the piracy literature has also looked at heterogeneity in popularity. Oberholzer-Gee and Strumpf (2007) find that there is no significant difference between the effect of piracy on music sales of popular and less popular artists. Bhattacharjee et al. (2007) find that the average time a music album stays on the sales charts decreases after file-sharing technologies become available. However, their results also indicate that albums promoted by ‘minor’ labels experience a significant positive shift.

## 2 Preliminary Evidence from a Natural Experiment

In this project we make use of a natural experiment in the market for illegal downloading to study movie box office revenues. Exogenous variation comes from the unexpected shutdown of the popular file hosting platform Megaupload.com on January 19, 2012, offering a unique opportunity for causal identification. We use weekly data from more than one thousand movies in wide range of countries spanning from 2007 until recently. The data is obtained from Boxofficemojo.com, a commercial provider of industry statistics. Our sample starts with the launch of Megaupload’s video streaming service, which made it considerably more convenient to watch pirated movies online. The estimation strategy is based on a quasi difference-in-differences approach. We compare box office revenues before and after the shutdown to a matched control group of movies unaffected by the shutdown. The control group is based on matching movie characteristics to the treatment group. We use country, calendar week, stage of the life-cycle and genre. Identification comes from cross-country and temporal variation.

We specify a conservative set of fixed effects including years, calendar week, country and genre. We find that the shutdown had a negative effect on box office revenues across all movies in our sample. When we control for movie fixed effects the coefficient is not significant. Adding an interaction of the shutdown dummy and the number of screens suggests a heterogeneous effect conditional on movie popularity. Box office revenues of movies shown on the average number of screens and below were

affected negatively, but the total effect is not statistically significant. For blockbusters (shown on a large number of screens) the sign of the marginal effect turns positive. These results are robust to various different sample designs and model specifications.

These counterintuitive preliminary findings may suggest support for the theoretical perspective of (social) network effects where file-sharing acts as a mechanism to spread information about a good from consumers with zero or low willingness to pay to users with high willingness to pay. The information-spreading effect of illegal downloads seems to be especially important for movies with smaller audiences. ‘Traditional’ theories that predict substitution may be more applicable to blockbusters.

### 3 Proposed Future Work

There are several limitations to our empirical analysis above. We outline some major issues and propose solutions to address them.

So far we have implicitly assumed that every movie shown in cinemas can also be found as a download or stream on Megaupload.<sup>1</sup> An alternative explanation for why we do not find an positive effect for small to average sized movies is that they were not available online. Another explanation would be that pirates moved quickly to similar services (e.g. Putlocker, BitShare), peer-to-peer networks, etc. To clarify this, we will gather file and traffic data at the movie-level from commercial providers such as MarkMonitor, Envisional, BigChampagne or Alexa. A third theory consistent with our results is that pirates moved to legal online channels after the shutdown of Megaupload. Corresponding usage and sales data could be obtained from commercial providers such as Nielsen, or directly from platforms such as iTunes and Hulu. In addition to direct fees for data purchases, we expect substantial manual data work by several student research assistants. We believe that additional data can substantially strengthen the project, as it would allow to go beyond temporal identification and assess the effect of the shutdown of Megaupload more directly.

Another type of limitation comes from the fact that we are not able to directly test the underlying micro mechanisms. We plan to collect additional data at the individual level that may indicate whether and which proposed theoretical mechanisms can be found in this context. Household surveys such as the British Household Panel or the German Socio-Economic Panel provide information on media consumption (such as how often respondents go to the movies) as well as the intensity of Internet usage. An additional option would be to purchase data from commercial providers which track socio-demographic variables of moviegoers.<sup>2</sup>

The proposed future work could further strengthen identification. Being able to rule out the alternative mechanisms described above, this project would not only have significant implications for economics and management research, but may also contribute to the recent global debate on copyright in the digital society.

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<sup>1</sup>The Department of Justice’s official press release states that Megaupload was “responsible for massive worldwide online piracy of numerous types of copyrighted works”, “including movies often before their theatrical release [...] on a massive scale.” (<http://www.justice.gov/opa/pr/2012/January/12-crm-074.html>)

<sup>2</sup>Aggregate statistics for Germany based on data from GfK can found in a report issued by the German Federal Film Board, <http://tinyurl.com/c97hkp3>.

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