Video games and piracy Evidence from two studies
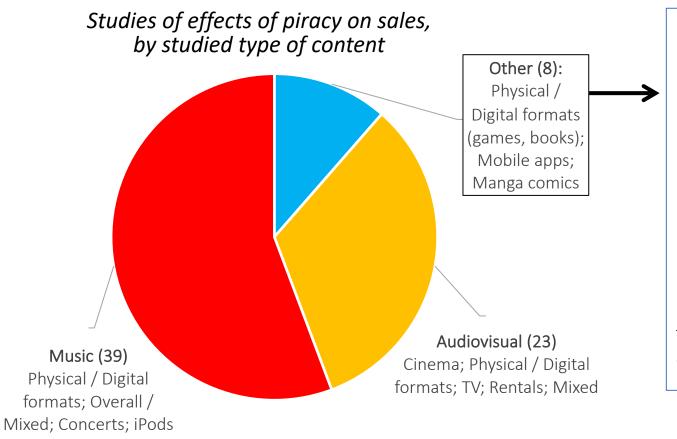
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Past piracy studies mostly on video/music

Studies of effects of piracy on sales, by studied type of content

Other (8):
Physical / Digital formats (games, books); Mobile apps; Manga comics

Music (39)
Physical / Digital formats; Overall / Mixed; Concerts; iPods

Audiovisual (23)
Cinema; Physical / Digital formats; TV; Rentals; Mixed

Source: Hardy (2019).

Of those only **two** published in journals:

Reimers, I. 2016. Can private copyright protection be effective? Evidence from Book Publishing. *Journal of Law and Economics* 59 (2), pp. 411-440.

Bastard, I., Bourreau, M. and Moreau, F. 2014. L'impact du piratage sur l'achat et le téléchargement légal. *Revue économique* 65, pp. 573-600.
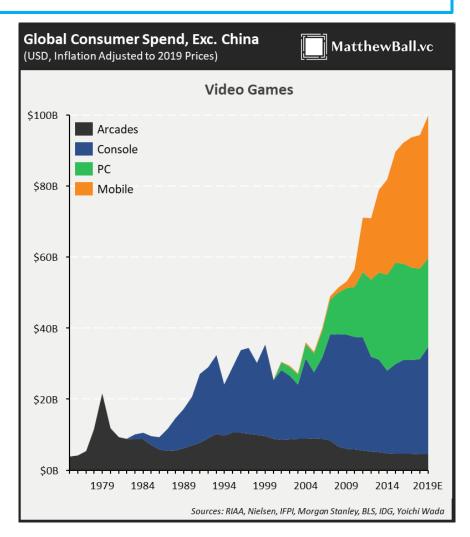
But games are a promising area for research

Video game industry is now larger than the music industry, the global Box Office or the streaming market, with faster growth and currently expanding to cloud gaming.

Large diversity of titles (platform/genre/number of players/size/budget/etc.)

Video games were first to be fully digital and have tried numerous DRM measures against piracy (with some proving effective)

Form of pirate distribution largely the same as 10-15 years ago, with large games accessible mostly through P2P torrent networks.

Source: graph by Matthew Ball (MatthewBall.vc).

Global Consumer Spend, Exc. China
(USD, Inflation Adjusted to 2019 Prices)

MatthewBall.vc

Video Games

- Arcades
- Console
- PC
- Mobile

$100B
$80B
$60B
$40B
$20B
$0B

1979 1984 1989 1994 1999 2004 2009 2014 2019E

Sources: RIAA, Nielsen, IFPI, Morgan Stanley, BLS, IDG, Yoichi Wada

Contribution: two studies on the effects of piracy on video game sales

Study 1: the effects of nation-wide blocks of piracy-enabling websites on the sales of video games.

Study 2: the effects of delaying unauthorised distribution of video games (DRM systems preventing early cracking) on sales.

Study 1 idea: Pirate website blocking effect

Danaher et al. (forthcoming) found that UK website blocking lowered visits to pirate websites and increased those to audiovisual subscription services (e.g. Netflix).

Their method:

- Panel of ~28,000 tracked UK internet users prior and after the blocks.

- Differences in effects moderated by the pre-block behaviour.

Full citation: *Danaher, B., Hersh, J.S., Smith, M.D. and Telang, R. (upcoming) The Effect of Piracy Website Blocking on Consumer Behavior. MIS Quarterly.*

Study 1: Pirate website blocking effect

This study:

Puchased data from Superdata (Nielsen company) on monthly digital sales of app. 200 PC games titles.
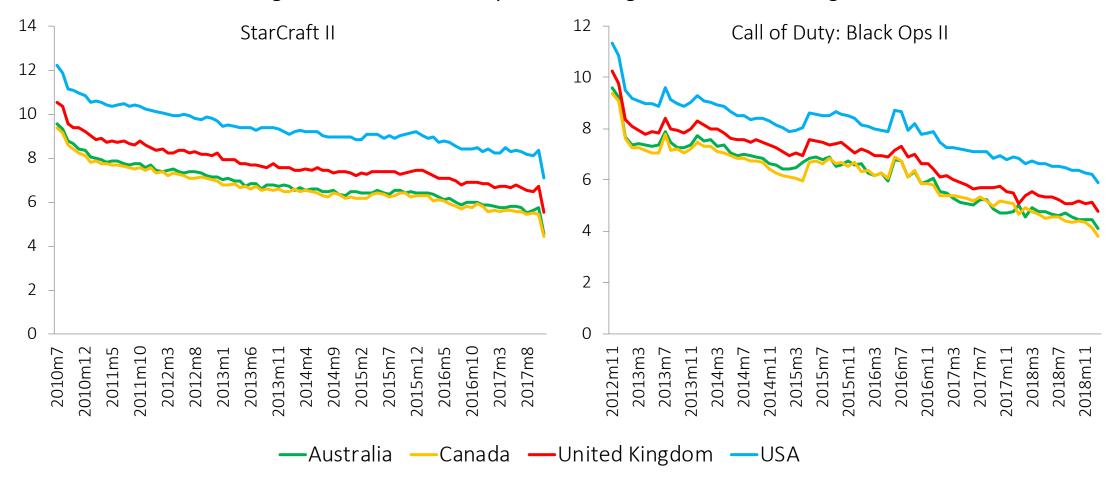
The data is provided for several regions, with English-speaking countries included in our study: Australia, Canada, UK, USA.

Mimicking the Danaher et al. (forthcoming) study, 3-month periods before and after the blocks are considered in an Difference-in-Differences setting.

The analysis covers UK blocks and Australian blocks of pirate torrenting websites.
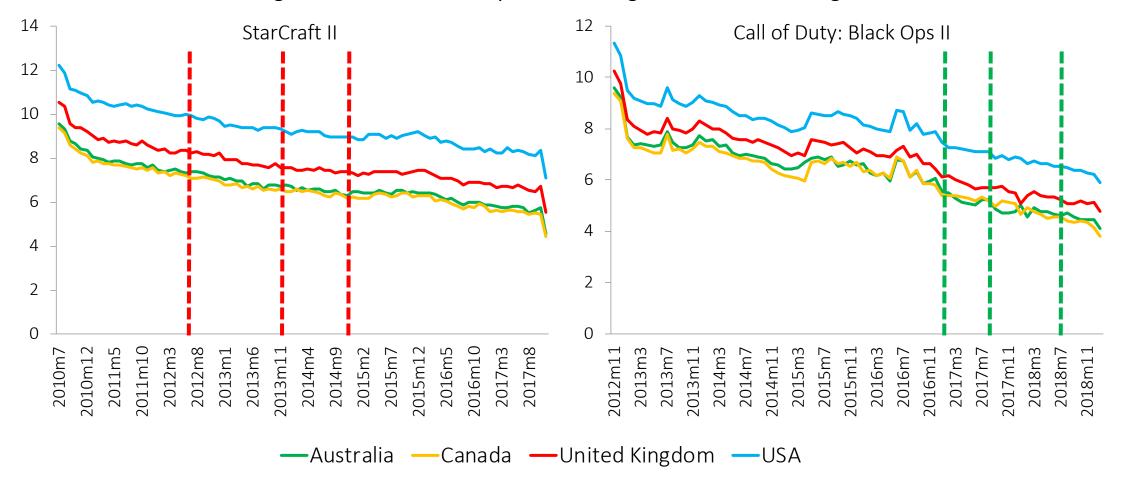
Observing the same game titles in four English-speaking regions ensures that the common trend assumption is satisfied

Log of sales for two examples of video game titles in four regions

StarCraft II

Call of Duty: Black Ops II

— Australia — Canada — United Kingdom — USA

However, the analysis shows no significant effect of any of the identified blocks (dates of blocks marked below)

Log of sales for two examples of video game titles in four regions

StarCraft II

Call of Duty: Black Ops II

Australia   Canada   United Kingdom   USA

What can explain the lack of effect for video games despite the evident effect for audiovisual content?

1) Not game age or online requirements: interactions with game age and single/multiplayer game type were also found insignificant.

2) Specific sample (200 rather popular titles, with some sequels)?

3) Gamers might be more tech-savy (e.g. Lifecourse, 2014) and thus better at omitting blocks. For example, a VPN solution could be enough to circumvent the implemented blocks.
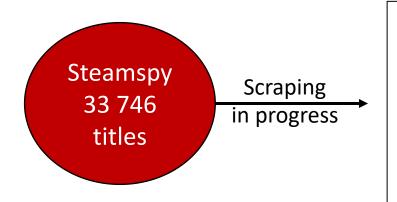
Study 2 idea: DRM versus cracking

Piracy of music/movies/books is fairly straightforward: creating a copy accessible to everyone is easy. Unauthorised copies are typically made available close to official release. Methods include stream ripping -> i.e. recording the audio and video outputs from a legal service.

Video games require two-way interactions, including user input. Thus, their piracy requires **cracking** the game code. This is typically done by specialised *Scene* groups.

Efficient DRM systems might delay cracking even for a year (Denuvo), thus introducing heterogeneity in the time of introduction of an illegal alternative.

Regular game updates, patches, downloadable content (DLCs) and online gameplay might make piracy even less practical.

Large and growing dataset on games
sales, pirate availability, characteristics

Steamspy
33 746
titles

Scraping
in progress →

Until April 2018, Steam store allowed to view publically user profiles, along with the list of the owned games.

Between 2015 and 2018, Steamspy selected a random sample of these profiles daily and used them to estimate ownership numbers among all Steam users (most of the digital market).
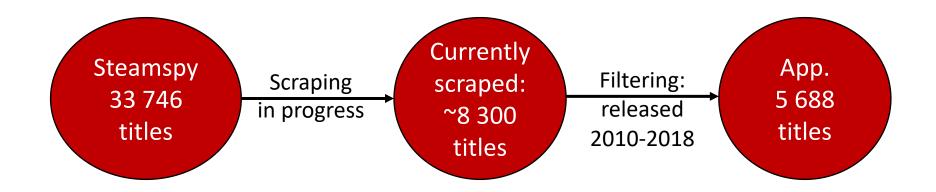
The scraping is an ongoing process, with initial findings presented for the current sample.

Steamspy

Accurate estimates of digital sales of market leader Steam (~75% market share)

Daily data for 2015-2018

Many game characteristics from the Steam API

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Scraping
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Currently
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~8 300
titles

Filtering:
released
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→

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Steamspy 33 746 titles → *Scraping in progress* → **Currently scraped: ~8 300 titles** → *Filtering: released 2010-2018* → **App. 5 688 titles**
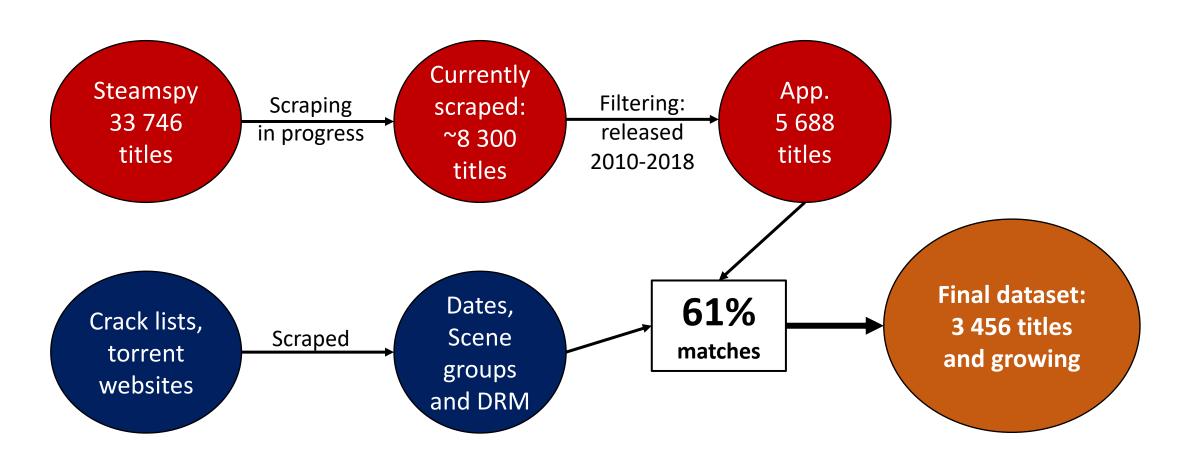
Crack lists, torrent websites → *Scraped* → **Dates, Scene groups and DRM**

Crack release lists (notifications on new crack releases by Scene and P2P groups):
xRel, crackwatch, skidrowreloaded, skidrowcodex

Torrent websites (allowing to browse whole PC games categories):
Rarbg, Fitgirl Repacks, Zooqle

Large and growing dataset on games
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Diff-in-Diffs: panel OLS with MLE
(similar results for Fixed Effects)

Explained variable: Monthly purchases

1) Median number of owners in each month

2) $Purchases_t = Median\_Owners_t - Median\_Owners_{t-1}$

3) Log(Purchases)

Is the game cracked? And interacted with:

1) Base explaining variable: game is already cracked (share of days cracked used if the game got cracked in a specific month).

2) Game is Single-player (share of tags): $\dfrac{SingleTags}{SingleTags+MultiTags}$

> Users of the Steam store can provide tags for games. Some games might provide both a multiplayer and singleplayer experience, but cracks typically work well only for the latter. The singleplayer variable reflects the proportion of singleplayer tags -> indicating that the game is perceived mainly as a single-player experience.

3) Price: median monthly price

4) Quality: share of positive reviews

5) Game by indie developers

6) Steam integration: achievements, trading cards, cloud saving
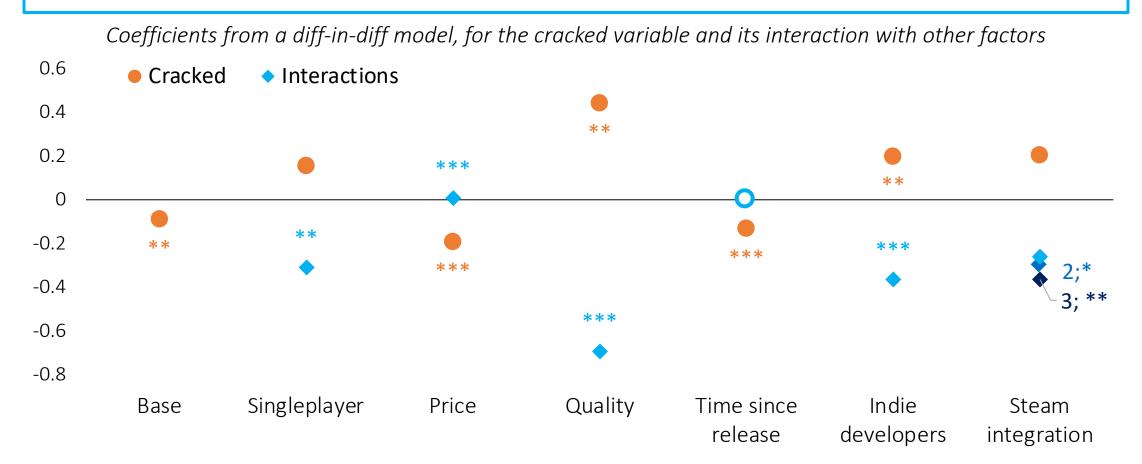
7) Months since release

Negative effects of getting cracked:
especially for high-quality and singleplayer games

Coefficients from a diff-in-diff model, for the cracked variable and its interaction with other factors

*Note: * - p-value<10%; ** - p-value<5%; *** - p-value<1%; Also controlling for genres; year+month effects; sales; discounts and the non-interacted terms*

Some results may stem from higher-level interactions (e.g. Indie developers do more single-player games)

Coefficients from a diff-in-diff model, for the cracked variable and its interaction with other factors

- ● Cracked
- ◆ Interactions

Y-axis values: 0.6, 0.4, 0.2, 0, -0.2, -0.4, -0.6, -0.8

X-axis categories: Base, Singleplayer, Price, Quality, Time since release, Indie developers, Steam integration

Base: ** (cracked, -0.1)
Singleplayer: ** (interaction), *** (cracked)
Price: *** (interactions), *** (cracked)
Quality: ** (cracked), *** (interactions)
Time since release: *** (cracked)
Indie developers: ** (cracked), *** (interactions)
Steam integration: 2;* 3; **

*Note: * - p-value<10%; ** - p-value<5%; *** - p-value<1%; Also controlling for genres; year+month effects; sales; discounts and the non-interacted terms*
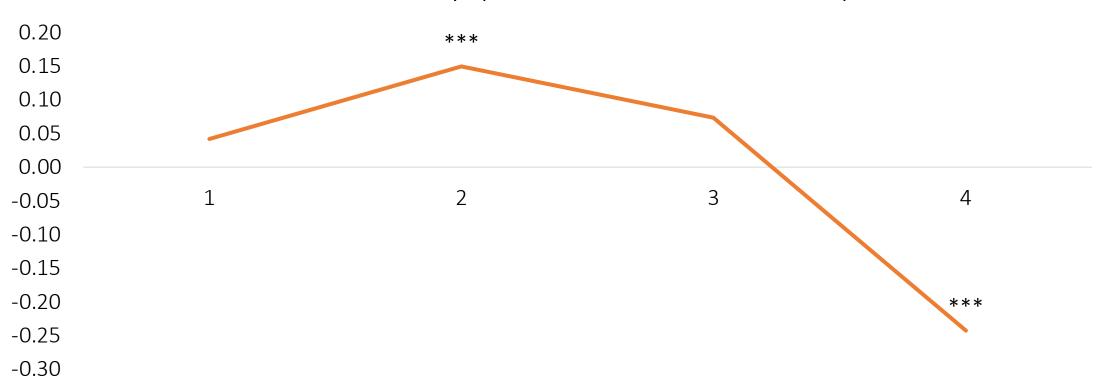
Differences for popular/unpopular titles

Crack effects by quartile of reached ownership

Note: * - p-value<10%; ** - p-value<5%; *** - p-value<1%; Also controlling for genres; year+month effects; sales; discounts and the non-interacted terms

To conclude: piracy has an effect, but

Blocking `pirate' websites isn't enough to remove it.

Multiplayer (online) games are safer.

Better rated games seem more likely to be harmed.

Better-selling games are more likely to be harmed.

Further steps needed to improve the study and disentangle all effects.

Next steps I

For Study 1:

We will check other regions for website blocking practices or laws mitigating piracy.

We will also check if the common trend assumption holds for other available regions.

We will add other game characteristics (e.g. control whether a game was cracked when a piracy block was implemented).

Next steps II

For Study 2:

Manual review to verify quality of matches and identify why 39% titles were not matched.

Potential steps:
- Better matching procedures (fuzzy matching)
- Selection stage (is crack date observed?)
- Including uncracked games from the unmatched 39% for reference

Different specifications:
- Instrumenting crack date with DRM type (controlling for developer, publisher, etc.).