Economics of BitTorrent Communities

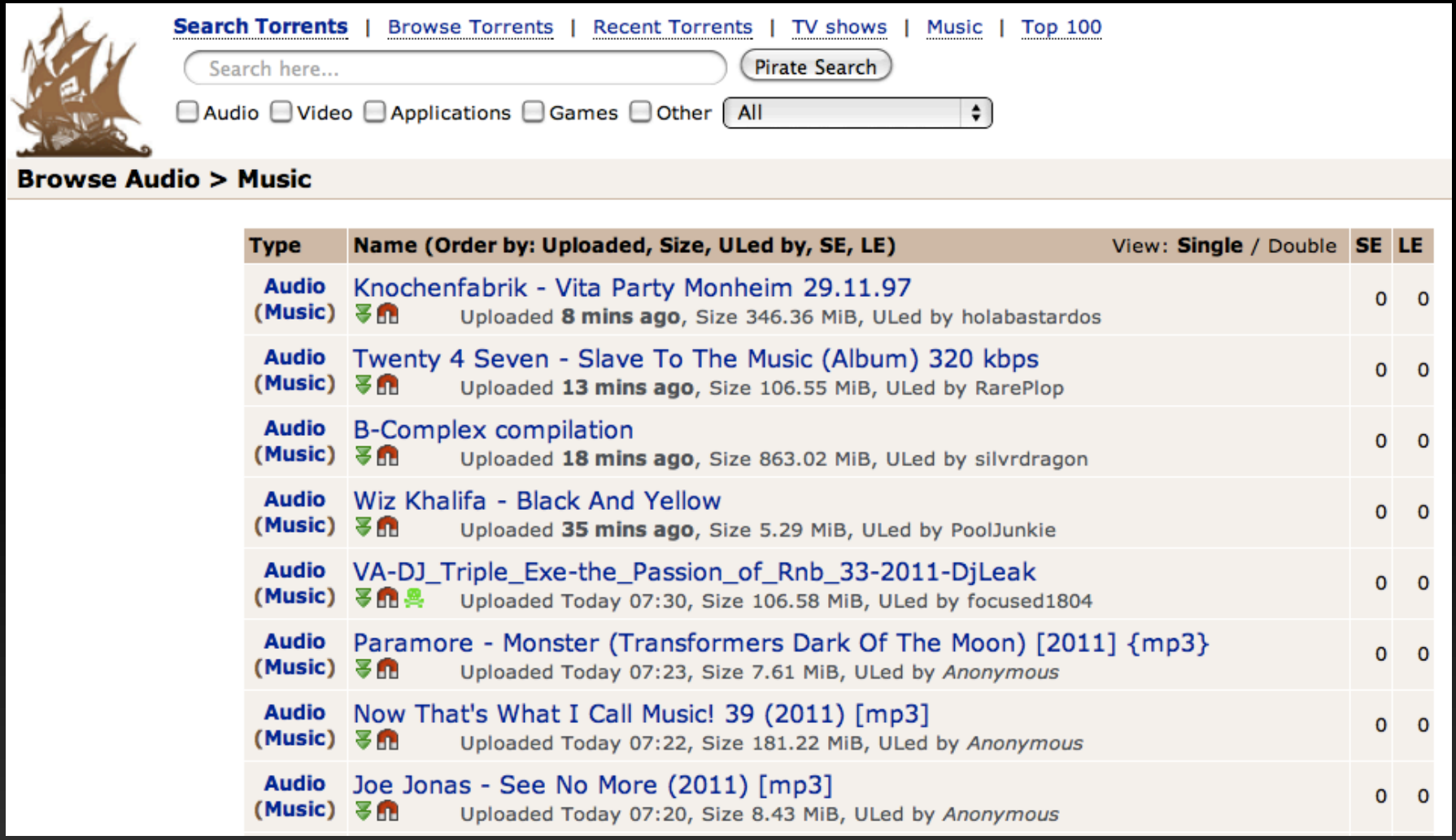
Ian Kash
John Lai
Haoqi Zhang
Aviv Zohar

NetEcon ‘11

Browse Audio > Music

Type	Name (Order by: Uploaded, Size, ULed by, SE, LE) View: **Single** / Double	SE	LE
Audio (Music)	Knochenfabrik - Vita Party Monheim 29.11.97 Uploaded **8 mins ago**, Size 346.36 MiB, ULed by holabastardos	0	0
Audio (Music)	Twenty 4 Seven - Slave To The Music (Album) 320 kbps Uploaded **13 mins ago**, Size 106.55 MiB, ULed by RarePlop	0	0
Audio (Music)	B-Complex compilation Uploaded **18 mins ago**, Size 863.02 MiB, ULed by silvrdragon	0	0
Audio (Music)	Wiz Khalifa - Black And Yellow Uploaded **35 mins ago**, Size 5.29 MiB, ULed by PoolJunkie	0	0
Audio (Music)	VA-DJ_Triple_Exe-the_Passion_of_Rnb_33-2011-DjLeak Uploaded Today 07:30, Size 106.58 MiB, ULed by focused1804	0	0
Audio (Music)	Paramore - Monster (Transformers Dark Of The Moon) [2011] {mp3} Uploaded Today 07:23, Size 7.61 MiB, ULed by *Anonymous*	0	0
Audio (Music)	Now That's What I Call Music! 39 (2011) [mp3] Uploaded Today 07:22, Size 181.22 MiB, ULed by *Anonymous*	0	0
Audio (Music)	Joe Jonas - See No More (2011) [mp3] Uploaded Today 07:20, Size 8.43 MiB, ULed by *Anonymous*	0	0

PirateBay



Search Torrents | Browse Torrents | Recent Torrents | TV shows | Music | Top 100

Search here... Pirate Search

Audio Video Applications Games Other All

Browse Audio > Music

Type	Name (Order by: Uploaded, Size, ULed by, SE, LE) View: **Single** / Double	SE	LE
Audio (Music)	Knochenfabrik - Vita Party Monheim 29.11.97 Uploaded **8 mins ago**, Size 346.36 MiB, ULed by holabastardos	0	0
Audio (Music)	Twenty 4 Seven - Slave To The Music (Album) 320 kbps Uploaded **13 mins ago**, Size 106.55 MiB, ULed by RarePlop	0	0
Audio (Music)	B-Complex compilation Uploaded **18 mins ago**, Size 863.02 MiB, ULed by silvrdragon	0	0
Audio (Music)	Wiz Khalifa - Black And Yellow Uploaded **35 mins ago**, Size 5.29 MiB, ULed by PoolJunkie	0	0
Audio (Music)	VA-DJ_Triple_Exe-the_Passion_of_Rnb_33-2011-DjLeak Uploaded Today 07:30, Size 106.58 MiB, ULed by focused1804	0	0
Audio (Music)	Paramore - Monster (Transformers Dark Of The Moon) [2011] {mp3} Uploaded Today 07:23, Size 7.61 MiB, ULed by *Anonymous*	0	0
Audio (Music)	Now That's What I Call Music! 39 (2011) [mp3] Uploaded Today 07:22, Size 181.22 MiB, ULed by *Anonymous*	0	0
Audio (Music)	Joe Jonas - See No More (2011) [mp3] Uploaded Today 07:20, Size 8.43 MiB, ULed by *Anonymous*	0	0

Category	Title	Avg. Speed	Comm.	Rating	Added	Size	Snatched	Seeders	Leechers	Upped by
	Radiohead live BBC Radio Theatre 2008 FM flac	0.00 KB/s	1	---	2011-06-06 06:29:42	356.34 MB	0 times	1	3	ertertwert
	Steve Wynn - Cruise Café, Oslo, Norway, August 22nd 1996 (From the Steve Wynn Archive)	0.00 KB/s	0	---	2011-06-06 06:15:53	561.51 MB	0 times	1	2	boerge
	Steve Wynn - Cruise Café, Oslo, Norway, August 21st 1996 (From the Steve Wynn Archive)	0.00 KB/s	0	---	2011-06-06 06:14:22	321.90 MB	0 times	1	3	boerge
	Kathleen Edwards, 2010-08-03, Toronto, Canada	0.00 KB/s	0	---	2011-06-06 05:33:05	357.98 MB	0 times	1	2	1chucho
	Korn - 2011-06-04 - Rock am Ring EinsLive PAL raw MPG	247.27 KB/s	4	---	2011-06-06 04:52:32	3.30 GB	0 times	1	15	jrsjumpy
	Taj Mahal - April 5 1979 Milano,Italy (SBD)	96.17 KB/s	10	---	2011-06-06 04:41:58	548.54 MB	32 times	33	8	greenerdude

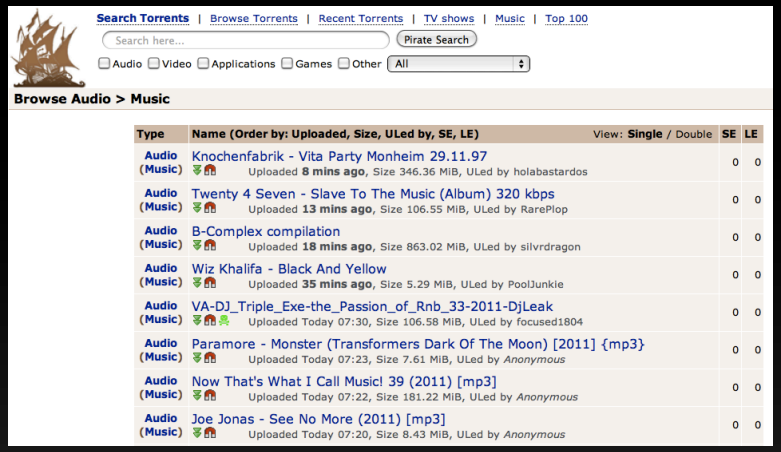
DIME

<< Prev Next >>

1 - 25 | 26 - 50 | 51 - 75 | ... | 37526 - 37550 | 37551 - 37575 | 37576 - 37600

Category	Title	Avg. Speed	Comm.	Rating	Added	Size	Snatched	Seeders	Leechers	Upped by
	Radiohead live BBC Radio Theatre 2008 FM flac	0.00 KB/s	1	---	2011-06-06 06:29:42	356.34 MB	0 times	1	3	ertertwert
	Steve Wynn - Cruise Café, Oslo, Norway, August 22nd 1996 (From the Steve Wynn Archive)	0.00 KB/s	0	---	2011-06-06 06:15:53	561.51 MB	0 times	1	2	boerge
	Steve Wynn - Cruise Café, Oslo, Norway, August 21st 1996 (From the Steve Wynn Archive)	0.00 KB/s	0	---	2011-06-06 06:14:22	321.90 MB	0 times	1	3	boerge
	Kathleen Edwards, 2010-08-03, Toronto, Canada	0.00 KB/s	0	---	2011-06-06 05:33:05	357.98 MB	0 times	1	2	1chucho
	Korn - 2011-06-04 - Rock am Ring EinsLive PAL raw MPG	247.27 KB/s	4	---	2011-06-06 04:52:32	3.30 GB	0 times	1	15	jrsjumpy
	Taj Mahal - April 5 1979 Milano,Italy (SBD)	96.17 KB/s	10	---	2011-06-06 04:41:58	548.54 MB	32 times	33	8	greenerdude

PirateBay



Search Torrents | Browse Torrents | Recent Torrents | TV shows | Music | Top 100

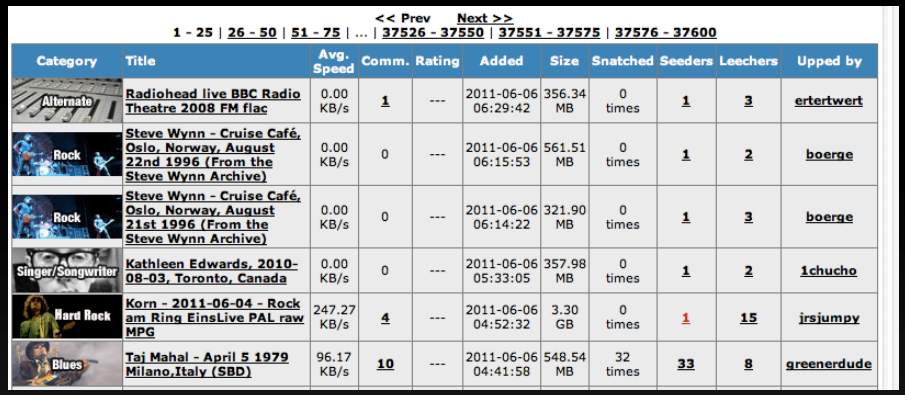
Search here... Pirate Search

Audio Video Applications Games Other All

Browse Audio > Music

Type	Name (Order by: Uploaded, Size, ULed by, SE, LE) View: Single / Double	SE	LE
Audio (Music)	Knochenfabrik - Vita Party Monheim 29.11.97 Uploaded **8 mins ago**, Size 346.36 MiB, ULed by holabastardos	0	0
Audio (Music)	Twenty 4 Seven - Slave To The Music (Album) 320 kbps Uploaded **13 mins ago**, Size 106.55 MiB, ULed by RarePlop	0	0
Audio (Music)	B-Complex compilation Uploaded **18 mins ago**, Size 863.02 MiB, ULed by silvrdragon	0	0
Audio (Music)	Wiz Khalifa - Black And Yellow Uploaded **35 mins ago**, Size 5.29 MiB, ULed by PoolJunkie	0	0
Audio (Music)	VA-DJ_Triple_Exe-the_Passion_of_Rnb_33-2011-DjLeak Uploaded Today 07:30, Size 106.58 MiB, ULed by focused1804	0	0
Audio (Music)	Paramore - Monster (Transformers Dark Of The Moon) [2011] {mp3} Uploaded Today 07:23, Size 7.61 MiB, ULed by *Anonymous*	0	0
Audio (Music)	Now That's What I Call Music! 39 (2011) [mp3] Uploaded Today 07:22, Size 181.22 MiB, ULed by *Anonymous*	0	0
Audio (Music)	Joe Jonas - See No More (2011) [mp3] Uploaded Today 07:20, Size 8.43 MiB, ULed by *Anonymous*	0	0

DIME

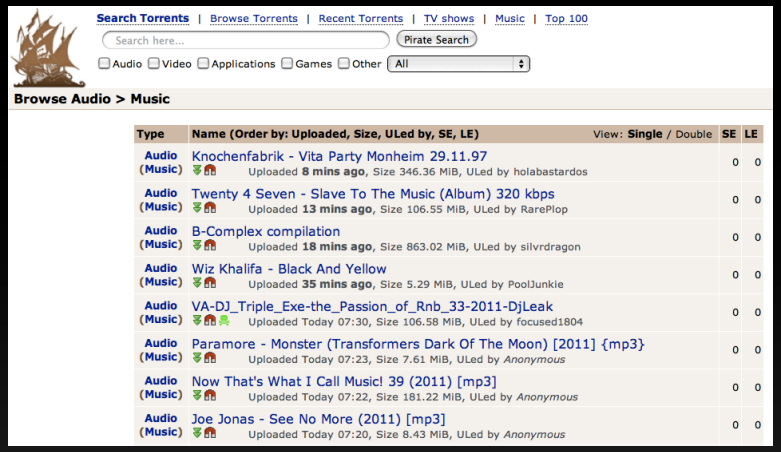


<< Prev Next >>

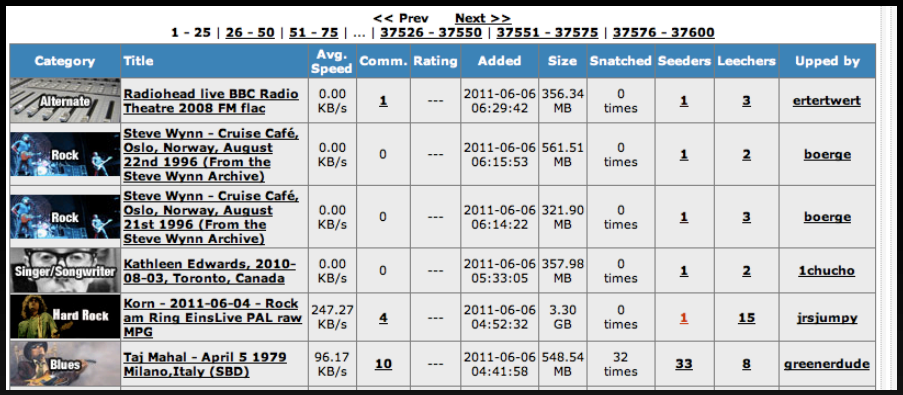
1 - 25 | 26 - 50 | 51 - 75 | ... | 37526 - 37550 | 37551 - 37575 | 37576 - 37600

Category	Title	Avg. Speed	Comm.	Rating	Added	Size	Snatched	Seeders	Leechers	Upped by
Alternate	Radiohead live BBC Radio Theatre 2008 FM flac	0.00 KB/s	1	---	2011-06-06 06:29:42	356.34 MB	0 times	1	3	ertertwert
Rock	Steve Wynn - Cruise Café, Oslo, Norway, August 22nd 1996 (From the Steve Wynn Archive)	0.00 KB/s	0	---	2011-06-06 06:15:53	561.51 MB	0 times	1	2	boerge
Rock	Steve Wynn - Cruise Café, Oslo, Norway, August 21st 1996 (From the Steve Wynn Archive)	0.00 KB/s	0	---	2011-06-06 06:14:22	321.90 MB	0 times	1	3	boerge
Singer/Songwriter	Kathleen Edwards, 2010-08-03, Toronto, Canada	0.00 KB/s	0	---	2011-06-06 05:33:05	357.98 MB	0 times	1	2	1chucho
Hard Rock	Korn - 2011-06-04 - Rock am Ring EinsLive PAL raw MPG	247.27 KB/s	4	---	2011-06-06 04:52:32	3.30 GB	0 times	1	15	jrsjumpy
Blues	Taj Mahal - April 5 1979 Milano,Italy (SBD)	96.17 KB/s	10	---	2011-06-06 04:41:58	548.54 MB	32 times	33	8	greenerdude

PirateBay



DIME



Public

Private

Private Bittorrent Communities

- Requires registration
- Controls membership
- **Can enforce sharing**

Share ratio enforcement

Join date	2010-03-31 18:04 GMT (61 weeks ago)
Last seen	2011-03-13 17:20 GMT (11 weeks ago)
Uploaded	5.55 GB
Downloaded	8.96 GB
Share ratio	0.62
Class	Uploader
Last used client	µTorrent 2.0.2.0

Incentives for continued seeding

Private communities form **economies**

Claim: Users in private communities respond to economic forces

“I'm having trouble boosting my ratio to an acceptable level. I'm keeping the BitTorrent window open after completing downloads (even 24/7!) and have retained all the downloaded files in my download directory to facilitate sharing but it's just not happening.”

“I've got the opposite problem. Having uploaded and then seeded a fair few niche items, my ratio is sitting just south of 25 (yes, twenty five, not 0.25).”

Previous work on private communities

- Mostly view as computer systems
  - [Andrade et al., Meulpolder et al., etc.]
- A few view as economic systems
  - [Hales et al.; Liu et al.]
  - Simulation/theoretical approach

Our work

Our work

- Half-year measurement study of DIME as an economic system

Our work

- Half-year measurement study of DIME as an economic system
- Age of a file affects its resale value

Our work

- Half-year measurement study of DIME as an economic system
- Age of a file affects its resale value
- People preferentially download older files during a free leech period

DIME

- 100,000 users (at capacity)
- Concert recordings
- System tracks upload and download
- Share ratio enforcement is only 0.25!

Methodology

- Periodic crawls of DIME website
  - Account profile snapshots
    - All users, daily
  - Torrent traces
    - 200-300 torrents
    - tracked since birth at 5 minutes intervals
  - Torrent snapshots
    - all torrents, daily

Earning and spending credit

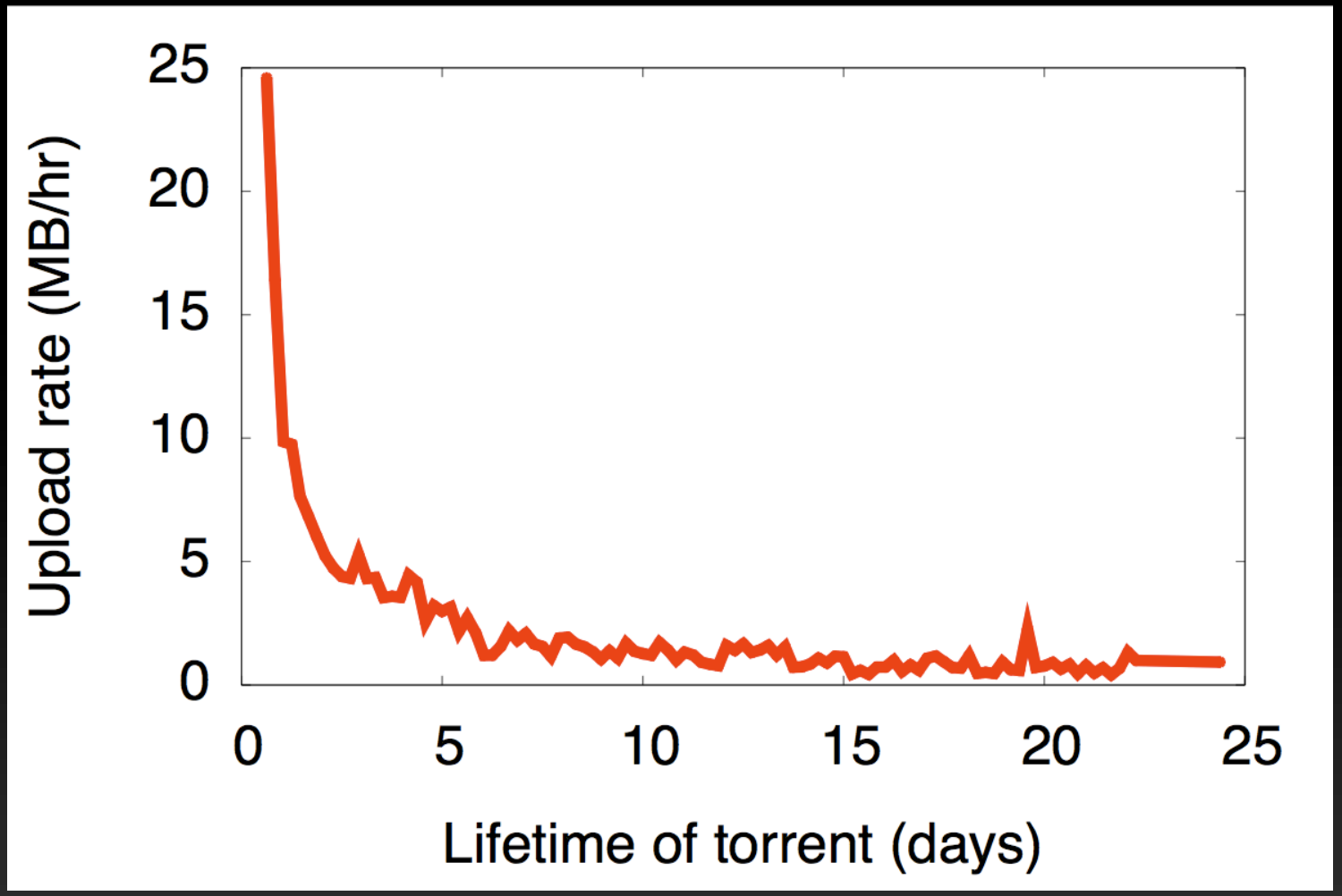
- Downloading a file spends credit
  - Price of a file is its size
- Uploading a file earns credit
  - Resale value is the potential upload rate

Age of a file vs. resale value

“[You should] download a brand new show (one that was just uploaded) that you expect to be very popular; especially if its one that has very few seeders and already has lots of leechers.

[…] Unless you have unique shows
to upload, this is really the only way to
keep your ratio up if you
check the site rarely enough that you
usually only download torrents
that have already been active for a
number of days or weeks (by which
time the demand has died down).”

“[Following this strategy] was critical for me. The more than 5 gigs of this show that I have shared allowed me to grab a couple of DVD torrents over 2 years old - only a couple of seeds left, and NO leechers. I've left them all open since I got them, some for MONTHS, still with ratios as low as .2! There's just no way that I can download **only** shows I want and keep my ratio up.”


Upload rate (MB/hr)
25
20
15
10
5
0
0
5
10
15
20
25
Lifetime of torrent (days)

Implications

- Joining a file early is a good way to earn credit
- But it's not necessarily easy
  - May not visit site that often
  - May not see anything of interest that is new

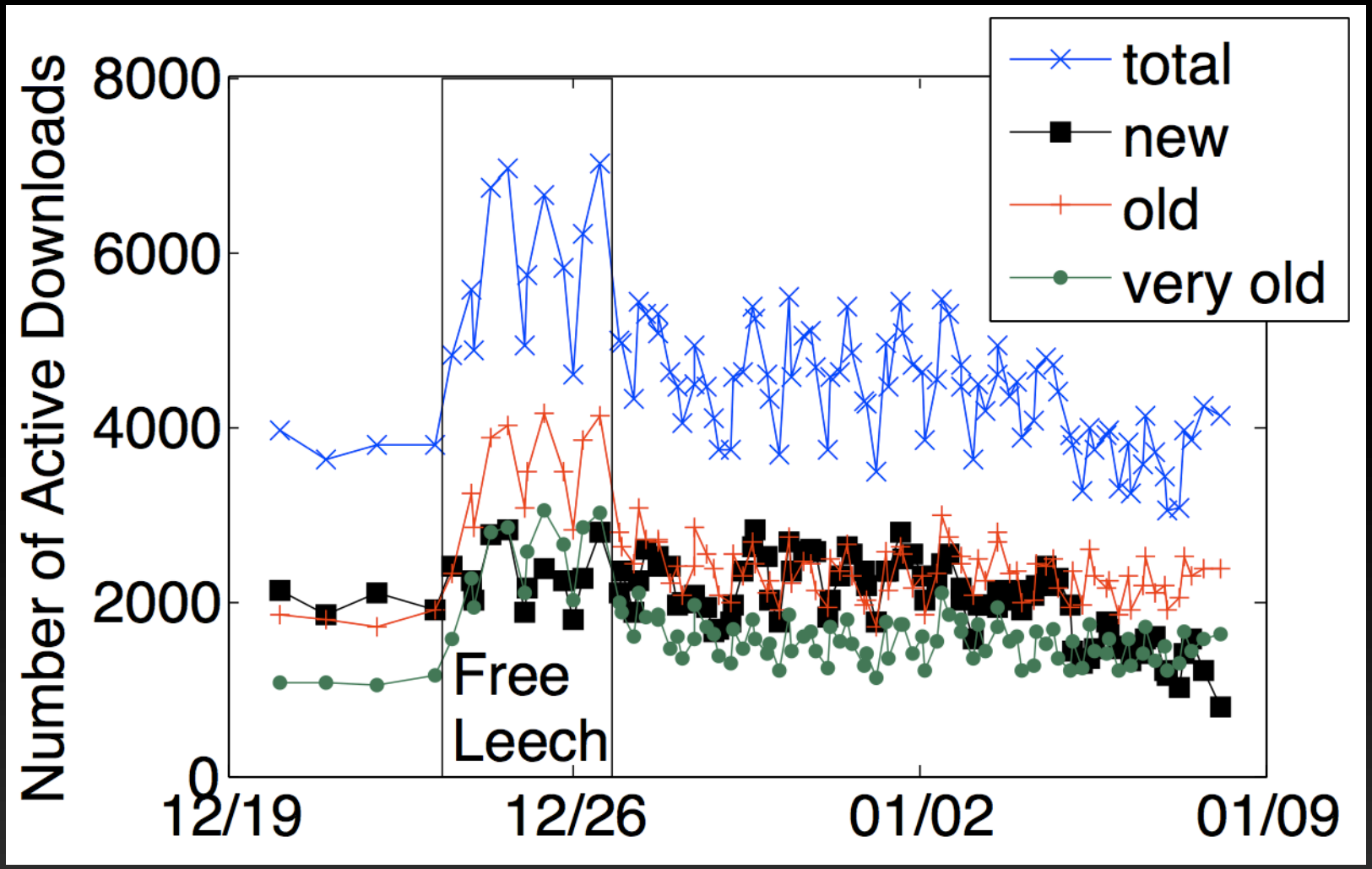
Do people react?

- Anecdotally, people seem to care about resale value when choosing what to download.

- Can we find evidence through user behavior?

A natural experiment

- Once a year, DIME has "free leech"
- Price of files are zero
- Hypothesis:
  - would download more files
  - In particular, the older files


Number of Active Downloads
8000
6000
4000
2000
0
12/19
12/26
01/02
01/09
Free
Leech
total
new
old
very old

Implications

- Users may not download things they want
- Remedies?
  - Have users visit the site more often
  - Variable pricing

Conclusion

- Study a private BitTorrent community as an economic system
- Provides insight into how people make decisions based on resale value due to timing
- Rich space of economic questions and design possibilities

Thank you