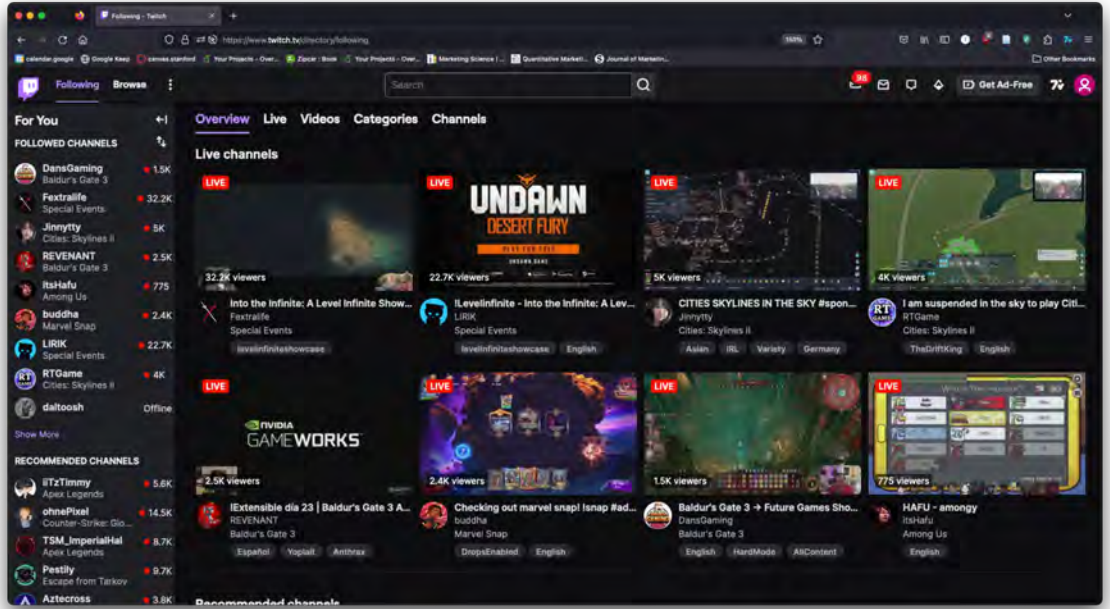
Signaling in Paid Product Placements: Theory and Evidence from Sponsorship Disclosure on Twitch

Ivan Li

University of Texas at Dallas

March 19, 2026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Baldur's Gate 3
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Jinnytty
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REVENANT
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Show More
RECOMMENDED CHANNELS
iiTzTimmy
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Overview
Live
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Live channels
LIVE
32.2K viewers
Into the Infinite: A Level Infinite Show...
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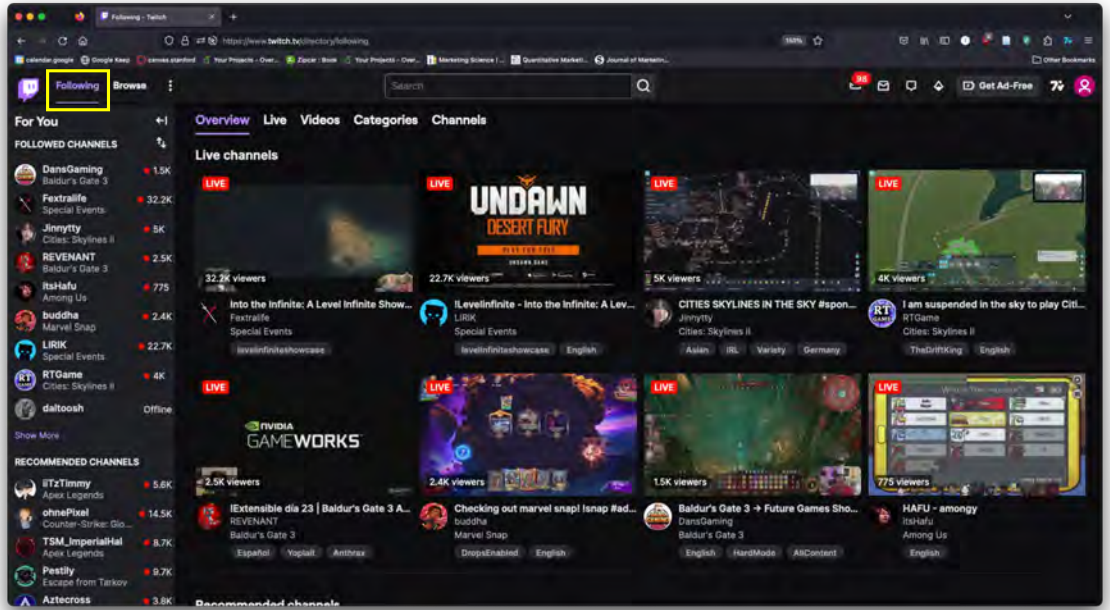
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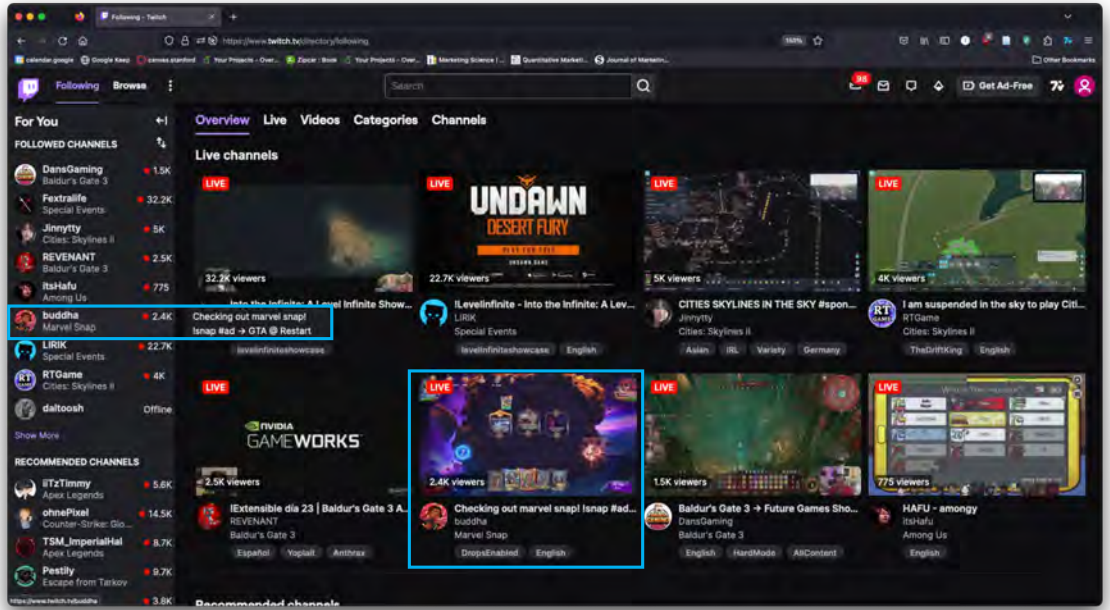
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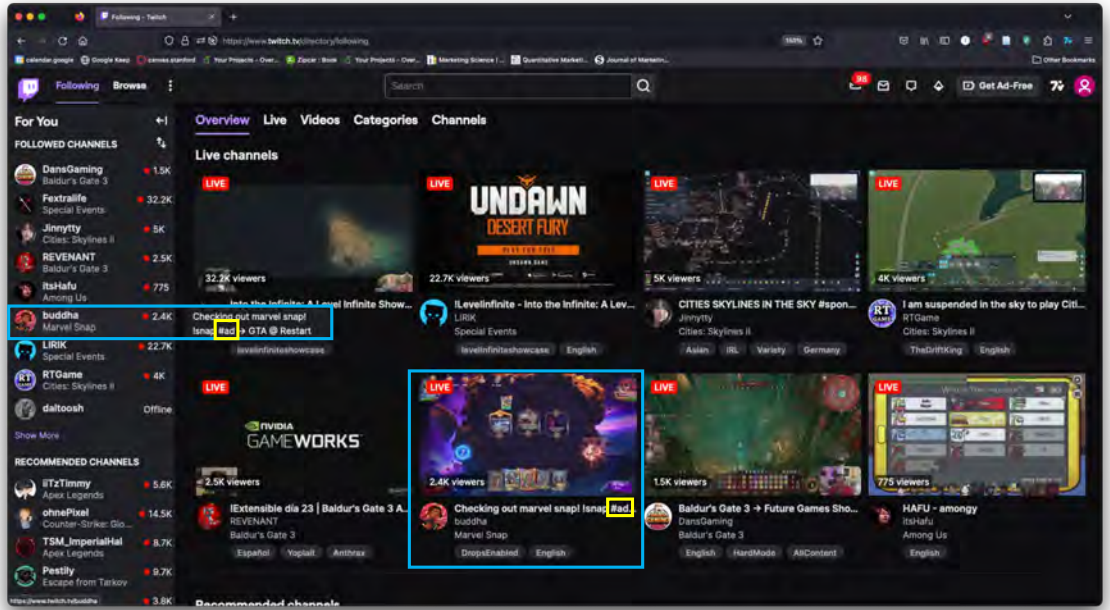
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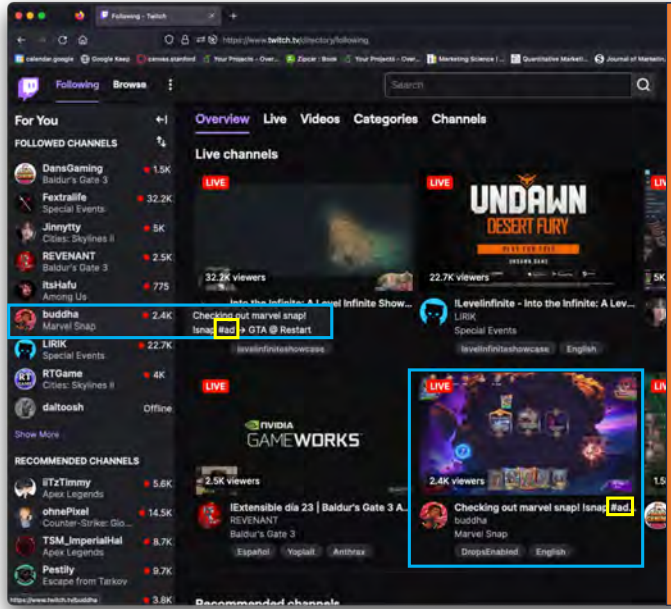
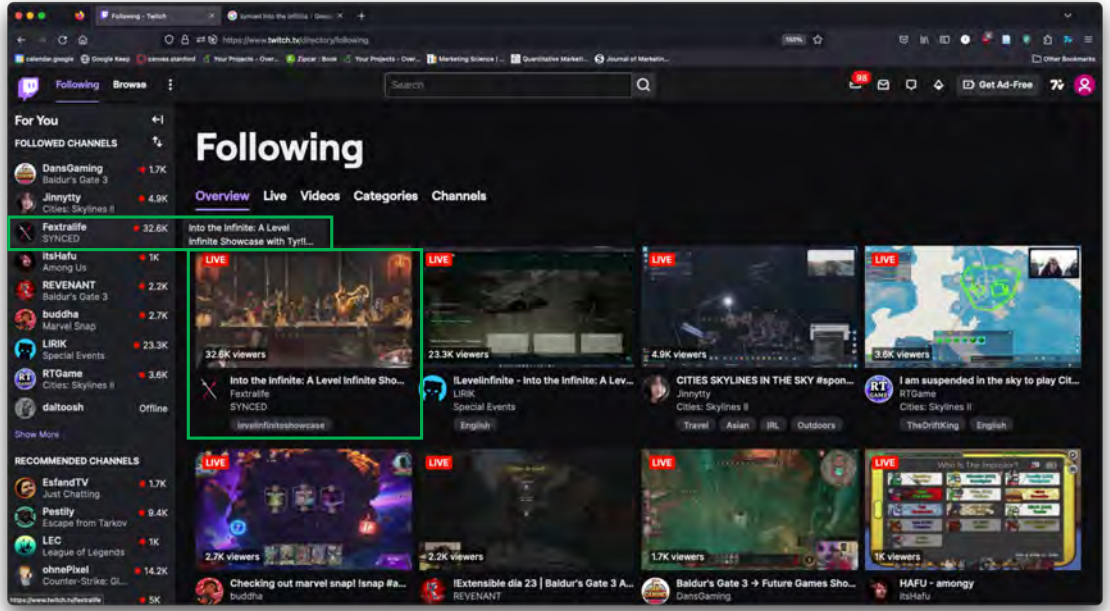


High Disclosure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Among Us
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Escape from Tarkov
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Fextralife
SYNCED
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LIVE
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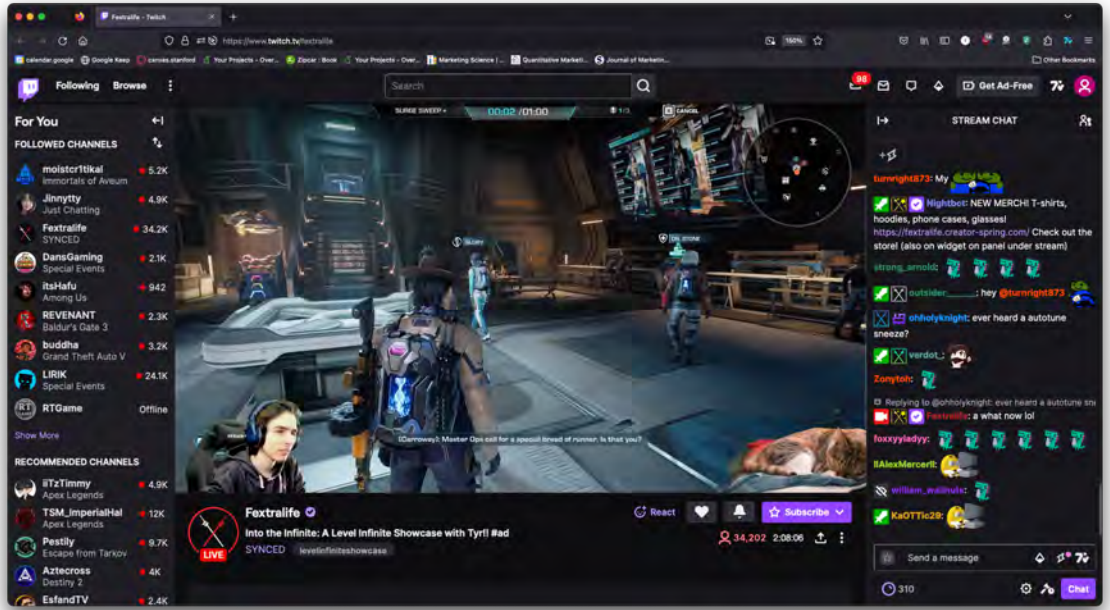
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Immortals of Aveum
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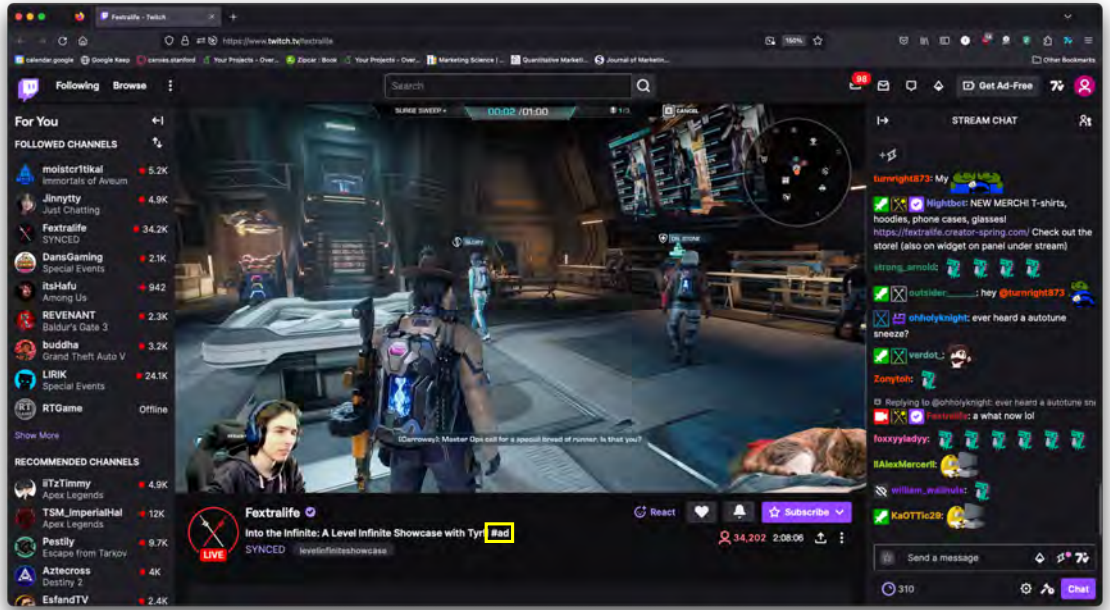
4K
EsfandTV
2.4K
Search
Get Ad-Free
STREAM CHAT
turnright873: My
Nightbot: NEW MERCH! T-shirts, hoodies, phone cases, glasses! https://fextralife.creator-spring.com/ Check out the store! (also on widget on panel under stream)
strong_arnold:
outsider_____: hey @turnright873
ohholyknight: ever heard a autotune sneeze?
verdot_:
Zonytoh:
Replying to @ohholyknight: ever heard a autotune sn
Fextralife: a what now lol
foxxyyladyy:
IIAlexMercerII:
william_wallnuts:
KaOTTic29:
Send a message
310
Chat
Fextralife
Into the Infinite: A Level Infinite Showcase with Tyrfi #ad
SYNCED
levelinfiniteshowcase
LIVE
React
Subscribe
34,202
2:08:06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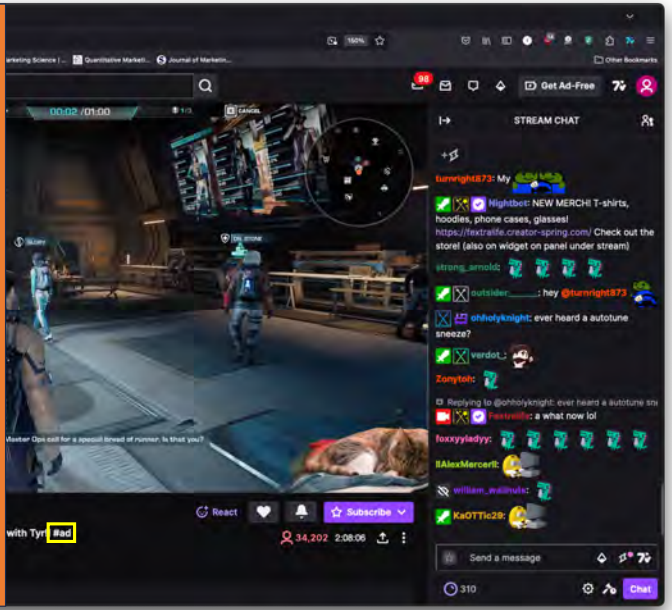
Low Disclosure



This paper uses theory and unique variation in revealed preferences to study disclosure

Research question 1: Why does prominent disclosure of paid product placements occur?

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Research question 2: Why do some platforms enforce prominent disclosure while others do not?

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Roadmap

This paper uses theory and unique variation in revealed preferences to study disclosure

Research question 1: Why does prominent disclosure of paid product placements occur?

Research question 2: Why do some platforms enforce prominent disclosure while others do not?

Roadmap

- **Theory:** signaling as a mechanism driving disclosure decisions

This paper uses theory and unique variation in revealed preferences to study disclosure

Research question 1: Why does prominent disclosure of paid product placements occur?

Research question 2: Why do some platforms enforce prominent disclosure while others do not?

Roadmap

- **Theory:** signaling as a mechanism driving disclosure decisions
- **Comparative statics:** analyze how prominent disclosure enforcement affects equilibrium outcomes

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Roadmap

- **Theory:** signaling as a mechanism driving disclosure decisions
- **Comparative statics:** analyze how prominent disclosure enforcement affects equilibrium outcomes
- **Empirics:** demonstrate that influencers on Twitch strategically choose prominent disclosure

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Roadmap

- **Theory:** signaling as a mechanism driving disclosure decisions
- **Comparative statics:** analyze how prominent disclosure enforcement affects equilibrium outcomes
- **Empirics:** demonstrate that influencers on Twitch strategically choose prominent disclosure

Note: In the context of Twitch, "disclosure" = prominent disclosure; I cannot identify nondisclosure

Related Literature

- Disclosure of sponsors in marketing: Berman (2020), Fainmesser and Galeotti (2021), Mitchell (2021), Pei (2022), Nistor (2024), Sahni and Nair (2020), Bairathi and Lambrecht (2023), Cheng and Zhang (2025), Ershov et al. (2025)
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  - This paper: disclosure as a strategic mechanism affecting engagement and reputation from paid placements
- Empirical Signaling: Feltovich et al. (2002), Bederson et al. (2018), Sahni and Nair (2020), Kawai et al. (2022)
  - This paper: general signaling framework for disclosure with reduced form empirical support

Overview

Signaling model

i

f

Signaling model

i

Only model disclosure decision, not sponsorship acceptance decision

f

Signaling model: influencers exogenously realize a sponsor with alignment θ

i

$\xrightarrow{\text{Realizes } \theta}$ $\theta \in \{\theta_H, \theta_L, \theta_0\}, \theta \in \mathbb{R}_{\geq 0}$, private information

Signaling model: influencers exogenously realize a sponsor with alignment θ

i

θ_0

Signaling model: influencers exogenously realize a sponsor with alignment θ

i

θ_H

θ_0

Signaling model: influencers exogenously realize a sponsor with alignment θ

i

θ_H

θ_L

θ_0

Signaling model: influencers exogenously realize a sponsor with alignment θ

i

θ_H $>$ θ_L

Signaling model: influencers exogenously realize a sponsor with alignment θ

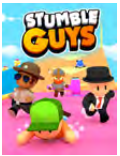
i

$\theta_0 \quad > \quad \theta_L$

Influencers choose intensity of disclosure

i

θ_H



% realization: qp_H

θ_L

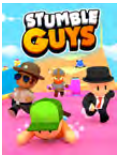
qp_L

θ_0

$1 - q$

Influencers choose intensity of disclosure

i

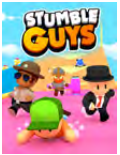
θ_H	θ_L	θ_0
		
% realization: qp_H	qp_L	$1-q$

- $q = P(\theta \in \{\theta_H, \theta_L\})$

Influencers choose intensity of disclosure

i

θ_H



% realization: qp_H

θ_L

qp_L

θ_0

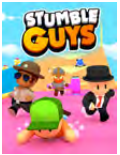
$1 - q$

- $q = P(\theta \in \{\theta_H, \theta_L\})$
- $p_H = P(\theta_H | \theta \in \{\theta_H, \theta_L\})$
- $p_L = 1 - p_H = P(\theta_L | \theta \in \{\theta_H, \theta_L\})$

Influencers choose intensity of disclosure

i

θ_H



HD LD

θ_L

HD LD

θ_0

LD

Followers observe choices and decide to click into stream or not

i

f

Followers observe choices and decide to click into stream or not

i

1. Choose j $\longrightarrow$ HD LD

f

Followers observe choices and decide to click into stream or not

i

1. Choose *j*

2. Observe *j*

f

HD

LD

Followers observe choices and decide to click into stream or not

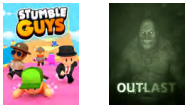
i

1. Choose j

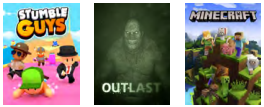
2. Observe j

f

HD



LD



Followers observe choices and decide to click into stream or not

i

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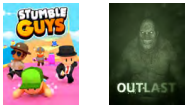
f

HD



$\mu_\theta(HD)$

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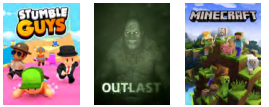

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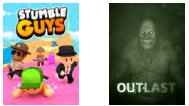

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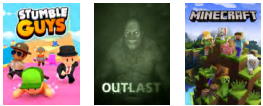

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$g \sim G(x)$, cost of engagement

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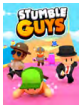

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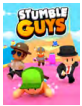

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If engage, engagement intensity: $v(\theta)$

Follow decisions/reputation impact: $c(j|\theta)$

Influencer's payoffs

Influencer's payoffs: $\pi_{ij} = 1\{k = engage\}v(\theta)[1 - c(j|\theta)] - c_{HD} \cdot 1\{j = HD, k = ignore\}$

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Partially-separating equilibria

Definition (Single-crossing condition)

The incremental reputation costs from choosing $j = HD$ over $j = LD$ must be larger for θ_L types than for θ_H types:

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Proposition 3 (Mixed-strategy "partial separation" PBE)

Under the same conditions, an equilibrium in mixed strategies can exist where θ_H types choose HD **more frequently** than LD, θ_L types choose LD **more frequently** than HD, and θ_0 types choose LD.

Enforcing high disclosure in a mixed-strategy PBE may decrease platform engagement

Pre-regulation: $\alpha \equiv P(HD|\theta_H) > \beta \equiv P(HD|\theta_L)$ (partial separation)

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$\implies$ Platforms may be incentivized *not* to enforce (prominent) disclosure policies

Overview

Twitch data: median influencer has 530 observations and 4 sponsored observations

Statistic (per streamer)	Mean	St. Dev.	Min	Pctl(25)	Median	Pctl(75)	Max
Observations	584.1	433.2	10	333	530	748	7,890
Num. streams	387.1	196.8	9	253	393	514	1,841
Num. unique games	52.1	78.0	1	12	27	61	1,148
Nobs sponsored	10.5	21.5	0	0	4	12	355
Nobs sponsored hi disc	1.4	4.8	0	0	0	1	74
Avg. conc. viewership	3,686	8,502	95	739	1,463	3,030	105,019
Avg. obs length (hr)	4.8	2.3	1.3	3.2	4.5	5.9	23.4
Initial followers	470,611	963,804	1,571	101,491	204,018	462,607	16,714,288
Follower change	156,484	321,117	−56,679	15,335	46,201	150,436	3,706,567

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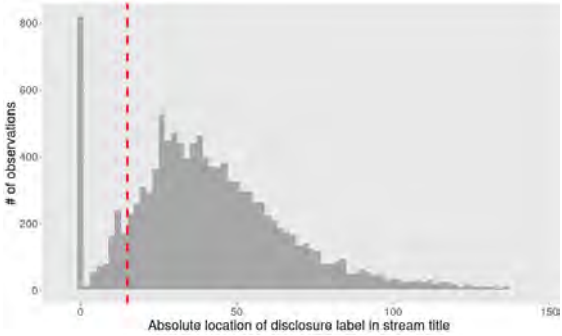

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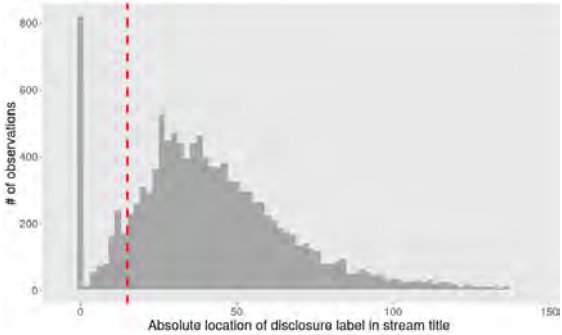

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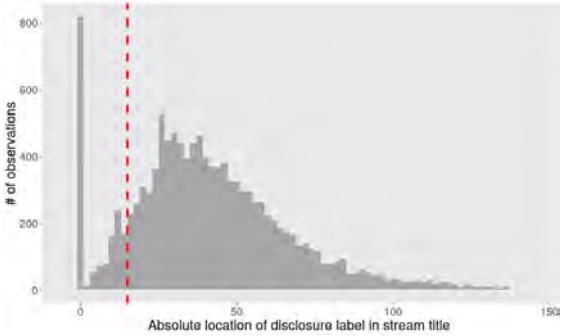

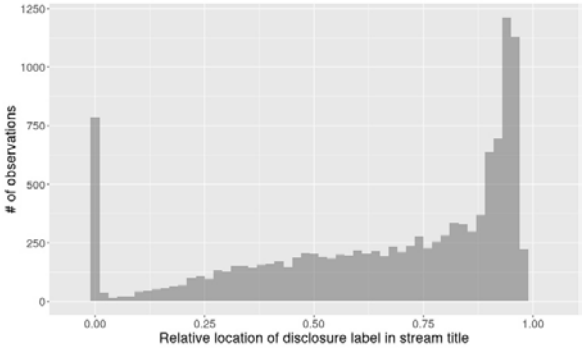

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Viewership is positively correlated with HD

	Y: Log ACV	
	Full sample	Sponsored only
Game dev sponsor (β_a)	−0.055	-
	(0.013)	
	[<0.001]	
Game dev sponsor HD (β_d)	0.115	0.065
	(0.031)	(0.019)
	[<0.001]	[0.001]
Observations	629,848	11,117
Influencer FE	✓	✓
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Table: OLS Regressions. Standard errors (in parentheses) clustered at the influencer level, p-values in [brackets]. Controls include game, stream, and influencer characteristics. Full results in appendix.

Viewership is positively correlated with HD, and so is follower change

	Y: Log ACV		Y: Δ followers/ACV	
	Full sample	Sponsored only	Full sample	Sponsored only
Game dev sponsor (β_a)	−0.055	-	−0.003	-
	(0.013)		(0.002)	
	[<0.001]		[0.184]	
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- Recall only 14% of sponsored streams have HD

Testing the single-crossing condition

Proposition (Wu-Hausman test for single-crossing)

Let y_{it} be a function of $c(j|\theta)$ (e.g. follower change/ACV) and z_{it} an instrument for HD_{it}. Under $c(LD|\theta_H) > c(LD|\theta_L)$, maintained assumptions, standard IV assumptions, and similar compliance across types:

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- Sample restricted to sponsored streams only (abstract away from selection into sponsorship)
- Mapping from $c(j|\theta)$ to data
- Need an instrument for the disclosure decision HD_{it}

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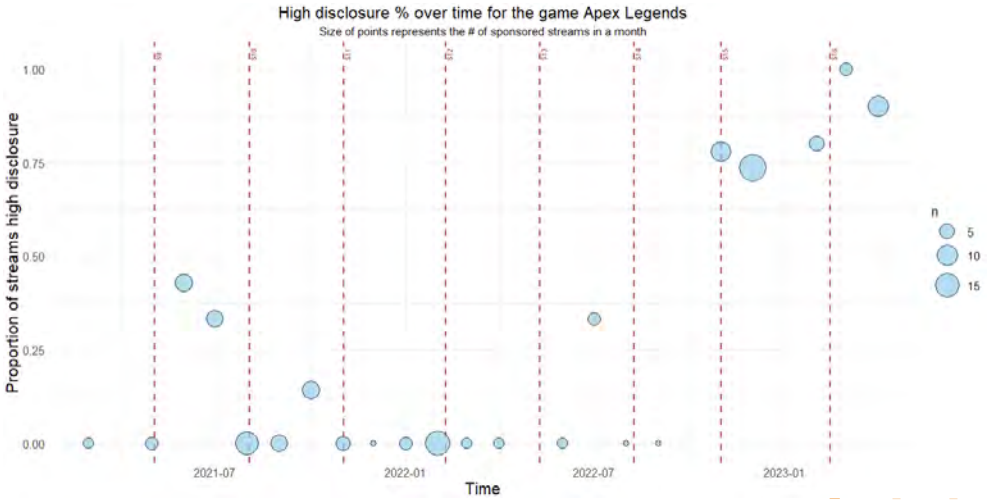

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$$z_{it} = \frac{\sum_{j \neq i} \sum_{\tau \in [t-30,t)} HD_{j\tau} \cdot ad_{j\tau} \cdot 1\{g_{j\tau} = g_{it}\}}{\sum_{j \neq i} \sum_{\tau \in [t-30,t)} ad_{j\tau} \cdot 1\{g_{j\tau} = g_{it}\}}$$

- Relevance: dev mandates $\rightarrow$ other influencers disclose $\rightarrow$ focal influencer also told to disclose
- Exclusion: dev cannot strategically assign disclosure to affect campaign performance

IV: high disclosure increases reputation costs; Wu-Hausman confirms single-crossing

	Y: Follower Change/ACV				Y: 1{HD}
	OLS	TSLS	PLIV	TSLS	First stage
	(1)	(2)	(3)	(4)	(5)
Game dev sponsor HD (β_d)	0.001	−0.074	−0.072	−0.040	-
	(0.002)	(0.036)	(0.038)	(0.016)	-
	[0.548]	[0.040]	[0.058]	[0.012]	-
Inst: % other disclose same game	-	-	-	-	0.161
	-	-	-	-	(0.038)
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Observations	11,117	11,117	11,117	11,514	11,117
Full controls + FEs	✓	✓	✓	-	✓
Influencer FE only	-	-	-	✓	-
First stage partial F (KP):					17.7

Table: IV regressions, sponsored streams only. SE clustered at influencer level, p-values in brackets. PLIV (col. 3) uses double-debiased ML (Chernozhukov et al., 2018). Cols. (3)–(4) satisfy the rich covariates condition (Blandhol et al., 2022). Col. (4) uses only influencer FE.

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- **Wu-Hausman test**: control function residual coef. $= 0.076$, SE $= 0.033$, $p = 0.020$ $\implies$ **reject exogeneity** $\implies$ single-crossing satisfied

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Thank you! yilun.li@utdallas.edu