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Paid Subscription and Tipping on Live Streaming Platform

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The Monetization of live-streaming content

- **Live-streaming content**
  - created in real time
  - distributed instantaneously over internet
  - real-time engagement from audience
- **Goal of the paper**
  - To understand the relationship of paid subscriptions and tipping in livestreaming industry

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Research Questions

- Are paid subscription and tipping substitute or complementary?
- Does subscribing to a channel lead to higher or lower tipping from a consumer?
  - Substitutes: Fairness (Chen, Koenigsberg, and Zhang 2017; Kim, Natter, and Spann 2009)
  - Complements: **Attention** from streamer(McLaughlin 2018)
- How does subscription affect non-subscribers' tipping behavior?

Source: "*The rise of the Twitch-preneurs and the evolution of tipping*", BBC, Sep 2018.

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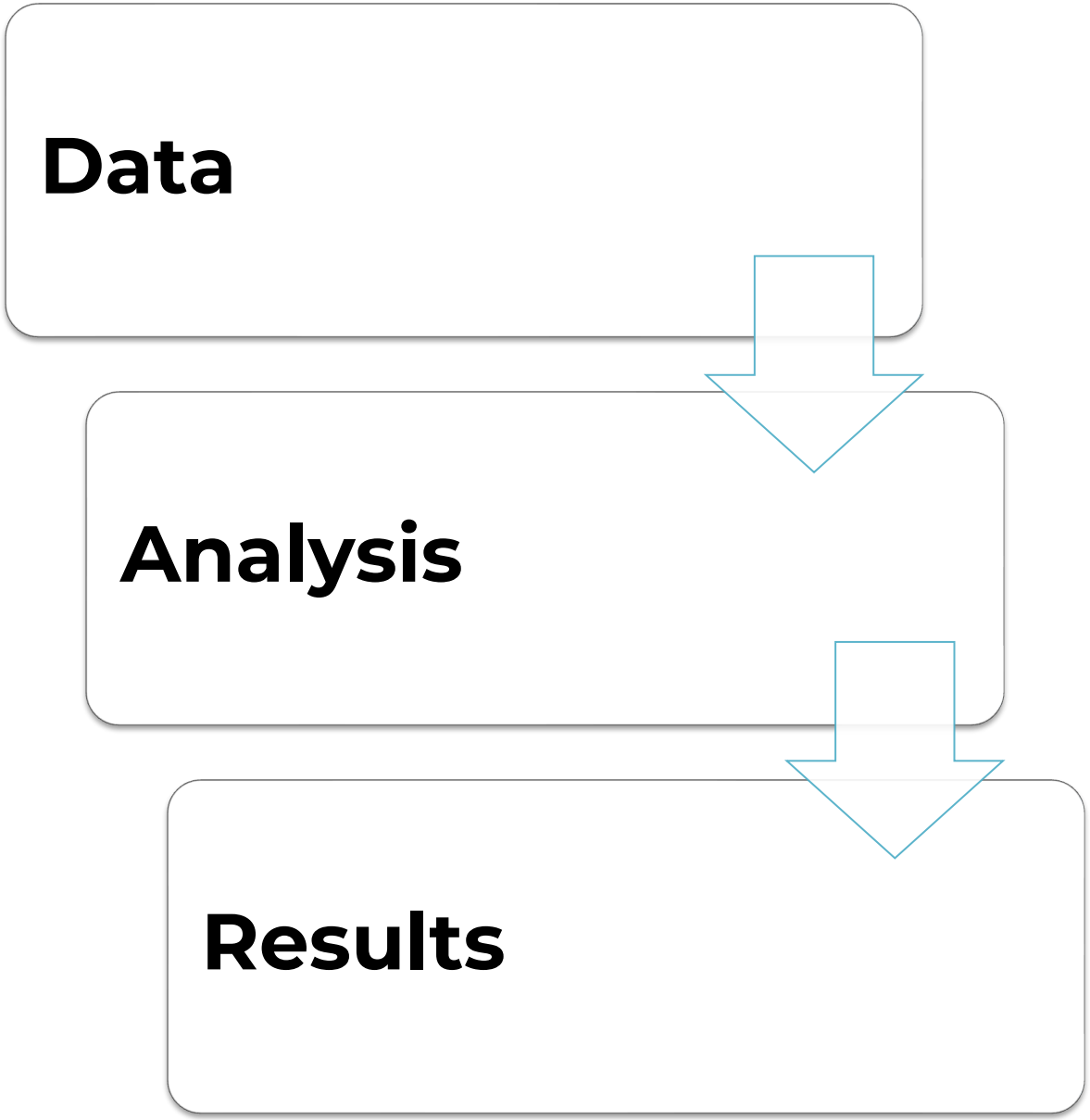
Literature

- Why do people tip in various settings
  - Fairness/reciprocity(Chen, Koeningsberg, and Zhang 2017, Chen, et al 2023); Social norm(Azar, 2007, Jung, et al 2014); Reference prices(Jung, et al 2014, Kim, Kaufmann, and Stegemann 2014); Social image(Lu, et al 2021)
- Tipping on livestreaming
  - Tipping is public: Social image(Lu, et al, 2021)
  - Dynamic environment: emotion(Lin, Yao, and Chen, 2021)
- Managing multiple monetization tools
  - Advertising & subscription(Lambrecht, Misra 2017)
  - Advertising & tipping(Jain, Qian 2021)

Roadmap



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Data

- **June 1st 2023 to Sep 1st 2023(92 days)**
- **463 channels with subscription feature**
  - In total, 48193 streaming sessions
- **Real-time individual activities**
  - Subscribe, tip, like, comment, etc
  - Aggregate to session level in analysis
- **Focus on viewers for each channel**
  - Participate in at least 10 sessions
  - Incur at least 200 instances of activities(subscribe, tip, like, comment, share)

Empirical Strategy

- In data span, 4166 viewers switched from non-subscriber to subscriber
- We want to conduct diff-in-diff analysis

$$\log tip\ amount_{ijs} = \beta * subscription_{ijs} + \alpha_{ij} + \gamma_s + \varepsilon_{ijs}$$

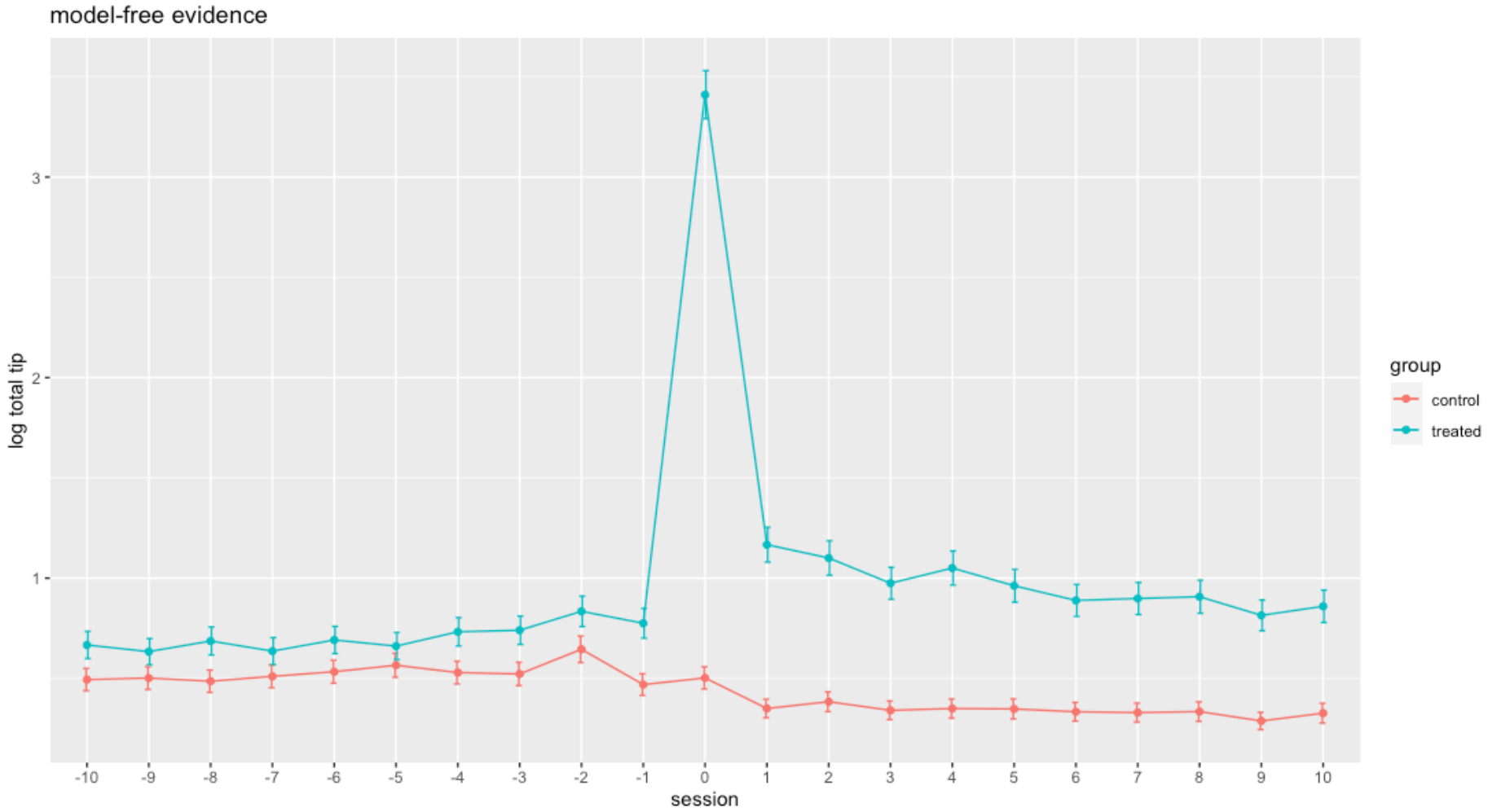
  - i: viewer
  - j: channel
  - s: session
  - control for viewer-channel FE, session FE

Empirical Strategy

- Empirical challenge: Endogenous selection into subscription
- Assumption: Parallel pre—trend assumption
- Propensity score matching
  - Goal: match each treated viewers with viewers in the same channel
  - Viewers' connection with streamer: follow, mutual follow, moderator
  - Behavior prior to subscription(10 sessions): total tip amount, total likes, total comments, total shares, etc…

Model-free Evidence

How does subscription affect tipping?



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Results

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How does subscription affect tipping?

Table 1: Subscription Increases Tipping Amount and Session Attendance

	Dependent variable:		
	log tip amount	log attendance	conditional log tip amount
	(1)	(2)	(3)
subscription	0.267***	0.057***	0.332***
	(0.005)	(0.001)	(0.015)
User-Channel FE	YES	YES	YES
Session FE	YES	YES	YES
Observations	785,454	785,454	230,958
R^2	0.245	0.296	0.502
Adjusted R^2	0.198	0.252	0.413
Note:			*p<0.1; **p<0.05; ***p<0.01

Subscription increases the tip amount by 26.7%

Results

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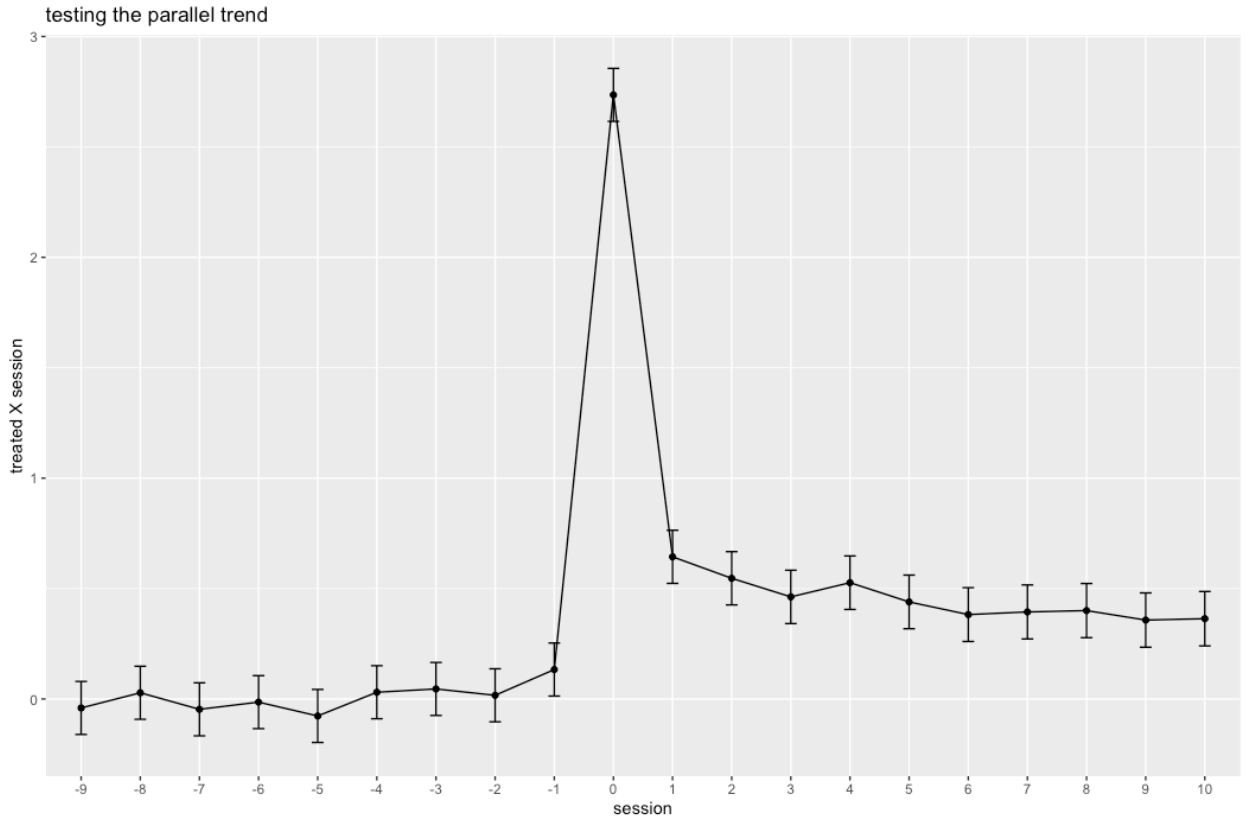
Subscription increases the attendance rate by 5.7%, and the tip amount conditional on attendance increases by 33.2%

Pre-trend Test



$$\log total\ tips_{ijs} = \sum_{s} \beta_s * treated_{ij} \times session_s + session_s + FE_{ij}$$

Next step

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How does subscription affect non-subscribers' tipping?

subscriber_tip_percent	tip_income	subscription_income	gift_percent
Min. :0.0000	Min. : 0.8	Min. : 4.99	Min. :0.1307
1st Qu.:0.1013	1st Qu.: 1981.3	1st Qu.: 34.93	1st Qu.:0.9675
Median :0.2813	Median : 8056.0	Median : 89.82	Median :0.9892
Mean :0.3244	Mean : 24784.0	Mean : 234.61	Mean :0.9552
3rd Qu.:0.5093	3rd Qu.: 25205.7	3rd Qu.: 209.58	3rd Qu.:0.9958
Max. :0.9706	Max. :639096.6	Max. :7489.99	Max. :0.9997

- Income from tipping are substantial
- Around 28% of the tipping comes from subscriber
- How does subscription affect non-subscribers' tipping?
  - Redistributional effect on streamers' attention

Conclusion

- We find complementarity between paid subscription and tipping
  - After subscription, viewers will increase their tipping amount, which suggest monetary complementarity
- Future steps:
  - Apply instrumental variable analysis
  - How does subscription impact the non-subscribers' tipping behavior?

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THANK YOU

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Results

User heterogeneity by platform-wise usage intensity

Table 3: The Effect of Subscription is More Positive with Heavy Users

	Dependent variable:		
	log tip amount	log attendance	conditional log tip amount
	(1)	(2)	(3)
subscription	0.474***	0.076***	0.621***
	(0.018)	(0.004)	(0.042)
I(subscription∗heavy user)	0.072***	0.024***	−0.131***
	(0.022)	(0.004)	(0.048)
User-Channel FE	YES	YES	YES
Date FE	YES	YES	YES
Observations	201,516	201,516	81,431
R^2	0.166	0.192	0.373
Adjusted R^2	0.152	0.178	0.347
Note:			*p<0.1; **p<0.05; ***p<0.01

Subscription has greater effect on heavy users by increasing its attendance rate

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Results

User heterogeneity by usage time

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How does subscription affect engagement?

Table 2: Subscription Increases Engagement

	Dependent variable:		
	log total likes	log total comments	log total shares
	(1)	(2)	(3)
subscription	0.410***	0.400***	0.011***
	(0.011)	(0.008)	(0.001)
User-Channel FE	YES	YES	YES
Date FE	YES	YES	YES
Observations	201,516	201,516	201,516
R^2	0.230	0.274	0.153
Adjusted R^2	0.217	0.262	0.140
Note:			*p<0.1; **p<0.05; ***p<0.01