Social media and the news industry

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Introduction

A few social networks have become dominant media for people with access to internet:

- Facebook in most countries. Over 2 bn users, spend one hour a day.
- WeChat in China
- VKontakte in Russia
- Line in Japan

These social networks allow users to

- connect, create and share content - UGC;
- access third party content, **including news.**

Introduction

Social media has become a major source of traffic to newspapers' sites:

- 51% of consumers get some news from social media (Reuters study on 26 countries)
- 12% use social media as their main news source
- For 18-24, social media above TV for news.
- Facebook drives more traffic to news sites than Google (not only Google News)

Consumers use **both** newspapers' websites and social network to access media (Mitchell et al. 2017)

Introduction

Central question of this paper: What is the long-term impact of social networks on the quality of news, and on the news industry more generally?

Approach: Model with multihoming consumers.

Compare two situations:

- Social media only shows UGC (no news) - benchmark
- Social media *strategically* shows news - endogenous newsfeed.

Warning: Paper **not** about consumers' beliefs (polarization, echo chambers...).

Introduction

Trade-off for newspapers

- Expand news consumption
- Indirect traffic less valuable (revenue sharing, brand dilution)

Issues for social platform

- How prominent should news be?
- Example: Facebook redesigned its newsfeed algorithm, to de-emphasize news (and favor UGC)

Overview

We study two models:

1. Monopolist newspaper v. social platform
2. Duopolist newspapers, with social platform

Main results

- Platform always shows some news,
- Platform showing news reduces newspapers' profits,
- Quality "tends to" go down.

The model

Two types of content:

- News, quality q at cost $c(q)$
- User-generated content, exogenous quality

Utility $U(x, y, \theta, q)$ where :

- x: quantity of news consumed. $\frac{\partial U}{\partial x} \geq 0$
- y: quantity of UGC: $\frac{\partial U}{\partial y} \geq 0$
- θ: consumer's taste for news (type): $\frac{\partial^2 U}{\partial x \partial \theta} \geq 0$
- q: news quality. $\frac{\partial^2 U}{\partial x \partial q} \geq 0$

θ distributed according to cdf F, pdf f (no atoms).

The model - consumers

Attention constraint: $x + y \leq 1$.
Desired news consumption: $\hat{x}(\theta, q)$. Increasing in θ and q.
$\hat{y}(\theta, q) \equiv 1 - \hat{x}(\theta, q)$

Consumer choice: Consumers can only allocate attention across firms: $\rightarrow$ t to platform, $1 - t$ to newspaper.

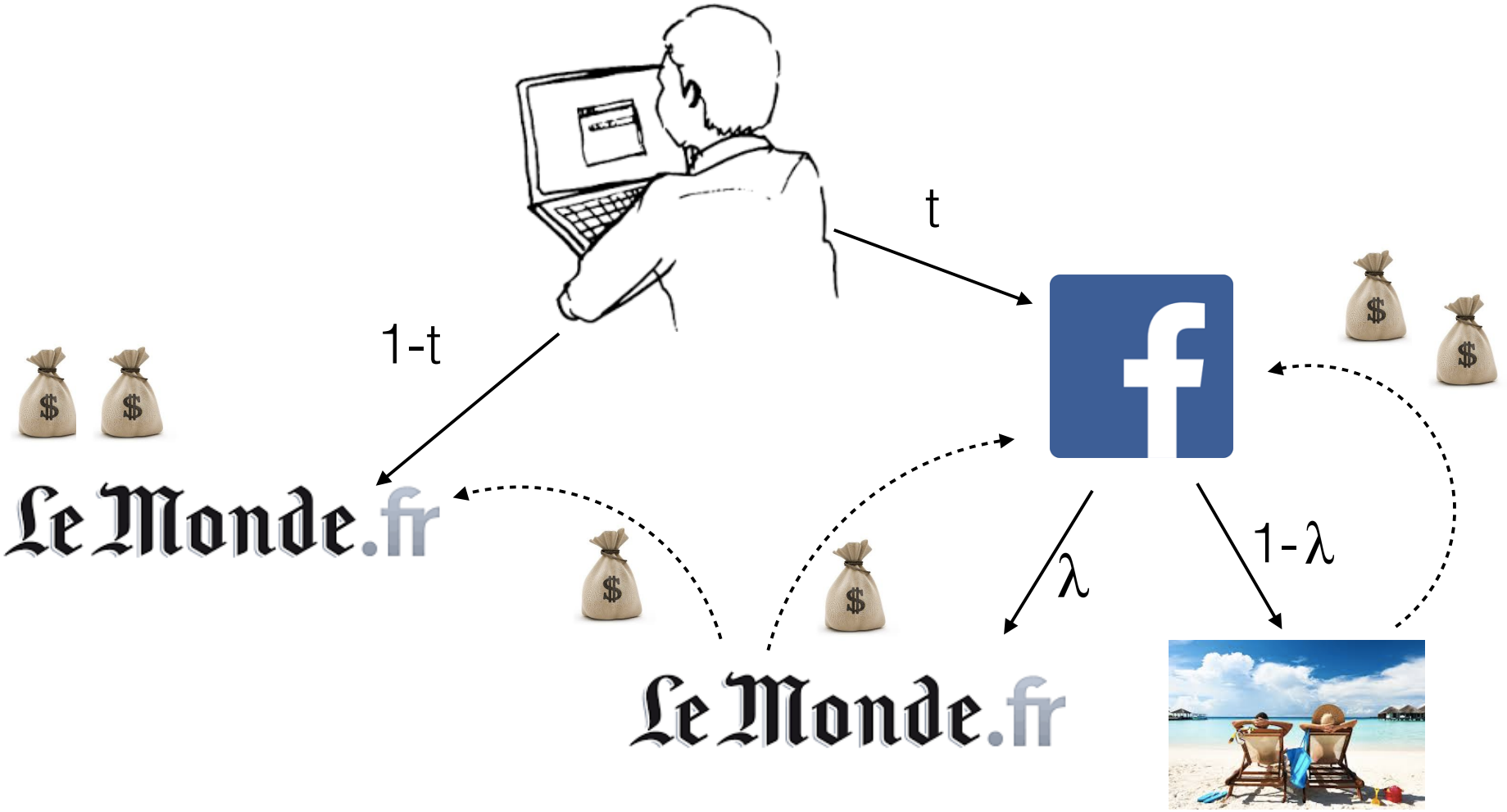
The model - firms

Newspaper

- Chooses quality q, cost $c(q)$.
- Advertising revenue from direct traffic (1), and from indirect traffic $(1 - \phi < 1)$. (per unit of attention)

Social Platform

- Chooses $\lambda =$ share of news on newsfeed.
- λ is uniform (for now) - no personalization
- Advertising revenue: 1 from UGC, $\phi < 1$ from link to news.


t
1-t
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1-λ
Le Monde.fr

The model: Firms' profits

Notation:

- $t(\theta, q, \lambda)$: attention to platform by consumer θ.
- $T_0(q, \lambda) = \int t(\theta, q, \lambda) dF(\theta)$.
- $T_1(q, \lambda) \equiv 1 - T_0(q, \lambda)$: total time spent on newspaper's website.

Profits

- Platform: $\pi_0(q, \lambda) = T_0(q, \lambda)\,(1 - \lambda + \lambda\phi)$
- Newspaper: $\pi_1(q, \lambda) = T_1(q, \lambda) + T_0(q, \lambda)(1 - \phi)\lambda - c(q)$.

The model

Timing

1. Newspaper chooses quality q.
2. Platform chooses newsfeed design λ.
3. Consumers choose how to allocate their attention.

Benchmark: only UGC in newsfeed, $\lambda = 0$

No friction on consumption: $t^*(\theta, q, \lambda = 0) = \hat{y}(\theta, q)$.

For given quality, efficient allocation of attention.

Quality $q^{\emptyset}$ maximizes $\pi_1(q, 0) = T_1(q, 0) - c(q)$, i.e.

$$\frac{\partial T_1(q^{\emptyset}, 0)}{\partial q} = c'(q^{\emptyset})$$

$\lambda \geq 0$: allocation of attention

- If $\hat{x}(q, \theta) < \lambda$ (i.e. $\theta < \hat{\theta}_1(q, \lambda)$): consumers would like to see more UGC than what platform shows $\Rightarrow t^*(\theta, q, \lambda) = 1$. Too much news.

- If $\hat{x}(q, \theta) \in [\lambda, 1]$: choose $t^*(\theta, q, \lambda)$ such that

$$t^*(\theta, q, \lambda)(1 - \lambda) = \hat{y}(\theta, q) \Leftrightarrow t^*(\theta, q, \lambda) = \frac{\hat{y}(\theta, q)}{1 - \lambda}$$

  Optimal consumption.

Design of newsfeed

Trade-off for optimal λ:

- $\uparrow \lambda \Rightarrow$ more attention from high types.
- $\uparrow \lambda \Rightarrow$ less revenue from low types.

Proposition: The platform chooses $\lambda(q) > 0$.

Proof: $\pi_0(q, \lambda) = T_0(q, \lambda)(1 - \lambda(1 - \phi))$.
$\frac{\partial \pi_0(q,\lambda)}{\partial \lambda}|_{\lambda=0} = \phi T_0(q, 0) > 0$.

Intuition: All consumers want to watch *some* news. Platform better-off if they get this "first unit" of news indirectly.

Effect on newspaper's quality (comparison with $\lambda = 0$

$$\frac{\partial T_1(q^{\emptyset}, 0)}{\partial q} = c'(q^{\emptyset})$$

$$\boxed{(1 - (1 - \phi)\lambda(q^*))} \frac{\partial T_1(q^*, \boxed{\lambda(q^*)})}{\partial q} = c'(q^*)$$

Two effects

1. $\lambda > 0$ lowers relative value of direct traffic: $\Rightarrow q \downarrow$
2. $\lambda > 0$ affects sensitivity of demand w.r.t. q: $\Rightarrow q \uparrow$
3. Overall effect is ambiguous in general.

Effect on newspaper's profit

Proposition: Newspaper's profit goes down.

Proof

- For any q, $R_0(q, \lambda(q)) > R_0(q, 0)$ (optimal λ increases platform revenue)
- True for q^*: $R_0(q^*, \lambda(q^*)) > R_0(q^*, 0)$
- We know that $R_0(q, \lambda) + R_1(q, \lambda) = 1$ for all, q, λ.
- Therefore $R_1(q^*, \lambda(q^*)) < R_1(q^*, 0)$
- Adding costs, $\pi_1(q^*, \lambda(q^*)) < \pi_1(q^*, 0)$.
- Revealed preference: $\pi_1(q^*, 0) \leq \pi_1(q^{\emptyset}, 0)$.
- Therefore $\pi_1(q^*, \lambda(q^*)) < \pi_1(q^{\emptyset}, 0)$

Extensions

- Personalized newsfeed
- Newspaper can opt-out
- Singlehoming consumers (work in progress)
- Competing newspapers (some results)

Personalized newsfeed

In practice platforms personalize newsfeed.

Suppose that platform can choose $\lambda(\theta, q)$.

- Platform chooses $\lambda(\theta, q) = \hat{x}(\theta, q)$.
- Consumers allocate all their attention to platform.
- Efficient consumption (for given q).
- Newspaper quality decreases w.r.t. benchmark: $\pi_1(q) = (1 - \phi)(T_1(q, 0)) - c(q)$
- Newspaper profit decreases.

Newspaper opt-out

Suppose now that:

- Newspaper can opt-out and prevent platform from showing news
- Platform can offer contract (λ, ϕ) (back to uniform newsfeed)
- Newspaper accepts or rejects offer, and chooses q.

Proposition: In equilibrium:

- Newspaper opts in. (indifferent)
- Quality is lower than benchmark.

Intuition: joint-surplus maximization $\Rightarrow$ cost reduction

Competition between newspapers

We consider 2 symmetric newspapers, of (endogenous) qualities q_1 and q_2. Consumers multihome between newspapers.

New assumptions:

- Quality no longer affects total quantity of news desired $\hat{x}(\theta) = \theta$.
- Quality affects relative market shares of newspapers: $s_1(q_1, q_2)\theta$ and $s_2(q_2, q_1)\theta$.
- s_i increasing in q_i, decreasing in q_j.
- Allows to focus on competition between newspapers.

Competition between newspapers

Timing

1. Newspapers choose q_1, q_2
2. Platform chooses λ
3. Consumers allocate attention.

News on the platform: If platform sets λ, indirect traffic to site i is $\lambda s_i(q_i, q_j)$ per unit of time on the platform. (Links reflect market share)

Effect of $\lambda > 0$ on quality of newspapers

Proposition: When quality only affects newspapers' relative market share, equilibrium quality goes down when the platform shows news, compared to benchmark of $\lambda = 0$.

Literature

News aggregators

- Jeon & Nasr (2016), Dellarocas, Katona and Rand (2010)
- Athey and Mobius and Pal (2017), Calzada and Gil (2016), Chiou and Tucker (2015).

Multi-homing Ambrus, Calvano and Reisinger (2015), Anderson, Foros and Kind (2014), Athey, Calvano and Gans (2016), de Cornière and Taylor (2014).

Social media and news Allcott and Gentskow (2017)

Conclusion

Despite potential for increasing news consumption, social platform *strategically* showing links to news stories likely to harm newspapers and decrease quality.

Personalized newsfeed can allow the platform to monopolize attention.

Competition between platforms can alleviate this issue.

Appendix

Examples

Suppose that $\theta \to \mathcal{U}[0,1]$, and $U = \hat{x}(\theta, q) ln(x) + y$.

Additive model: $\hat{x}(\theta, q) = \theta + q$.

- Absolute effect of quality on demand for news constant across types.
- $T_0(q, \lambda) = \frac{1+\lambda-2q}{2}$
- $\lambda(q) = q + \frac{1}{2}\frac{\phi}{1-\phi}$ (if ≤ 1)

Multiplicative model: $\hat{x}(\theta, q) = \theta q$.

- Relative effect of quality on demand for news constant across types.
- $T_0(q, \lambda) = \frac{1+\lambda}{2q}$
- $\lambda(q) = \frac{1}{2}\frac{\phi}{1-\phi}$

Newspaper's quality choice

$$\pi_1(q,\lambda(q)) = \underbrace{T_1(q,\lambda(q)) + T_0(q,\lambda(q))(1-\phi)\lambda(q)}_{\equiv R_1(q,\lambda(q))} - c(q)$$

Remark $R_0(q,\lambda) + R_1(q,\lambda) = 1$ for all, q, λ.

$$\frac{d\pi_1(q,\lambda(q))}{dq} = \frac{\partial R_1(q,\lambda(q))}{\partial q} + \lambda'(q) \underbrace{\frac{\partial R_1(q,\lambda(q))}{\partial \lambda}}_{=-\frac{\partial R_0(q,\lambda(q))}{\partial \lambda}=0} - c'(q)$$

FOC:

$$(1-(1-\phi)\lambda(q))\frac{\partial T_1(q,\lambda(q))}{\partial q} = c'(q) \qquad (1)$$