

When Big Brother Meets Big Profit

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Abstract

The Chinese government (“Big Brother”) demands that Social Network Service (SNS) companies (which make “Big Profit”) comply with their order to censor sensitive content. The government threatens to punish SNS companies in case of disobedience. At the same time, the government also benefits from the tax paid by these companies. I document and explain two noticeable trends in China: (i) The level of censorship by SNS companies decreases with their *de facto* tax rate. (ii) Bigger SNS companies exhibit higher levels of compliance with the government than smaller SNS companies. If the government sets a higher tax rate for the next tax year, it will benefit more from the profit made by the company. Hence the government has weaker incentives to punish the company in case of disobedience. Therefore, the company also has weaker incentives to comply with the government. The higher censorship levels of bigger SNS platforms can be explained by stronger incentives for the government to stop circulating sensitive information on bigger platforms.

1 Introduction

The tragic death of an overworked content moderator at Bilibili, one of China’s largest video streaming platforms, during the Lunar New Year holiday in 2022 startled the public. People were angry for many reasons. Bilibili’s first reaction was to deny that the employee had been overworked by deleting his employee profile and attendance record in its internal system. After the news was leaked,

the discussion of his death immediately became one of those “sensitive” topics that are prohibited both inside the company and on Bilibili.com. The provoked public indignation by the death of the overworked censor only made Bilibili censors even busier, censoring one more topic. This unexpected incident also made the public aware of the pervasiveness of content moderation on Social Network Service (SNS) platforms in China. Bilibili finally released a public announcement, saying that 1,000 more content moderators would be hired in 2022 to ease the workload of the content moderation team. There were over 2,400 employees in this team, which was roughly 30% of the total employees at Bilibili. Still, Bilibili is not the largest job provider for content moderators in China: By the end of 2020, ByteDance has more than 20,000 content moderators out of its 100,000 employees.

Why do SNS companies hire so many censors? Besides scrubbing content associated with violence, pornography, and fraud, among other things, they also need to comply with orders of the Chinese government (the “Big Brother”) to censor content that is deemed politically sensitive or offensive. The platforms have little to negotiate with the government regarding the scope of censorship. However, they have a degree of flexibility regarding how fast and well they respond to such orders (Knockel et al. 2015). Empirical findings show that different platforms have different response delays after the same event (Liu 2020). Disobedience by social media companies is quite common: 16% of government directives are disobeyed by Weibo because of concerns about censoring more strictly than its competitors (Miller 2018). This paper explains the choice of compliance level of an SNS platform using a dynamic model of two strategic players: the government and the SNS platform. The government sets a tax rate, the platform observes the tax rate and then chooses the level of censorship, and finally, the government decides whether to punish the platform by shutting it down. The government cares about its tax revenue but wants the platform to remove content it dislikes. The platform avoids censoring too much because it is costly but does not want to be punished by the government.

In the model, choosing a higher level of compliance is costly for the platform. Censorship by algorithm requires regular maintenance. The set of keywords the government wants to block is changing daily. Hiring machine learning experts who can write efficient programs and a large group of censors who manually

check suspicious content is expensive. On top of that, SNS companies do not want to censor too much because most censorship is done via friction, in other words, by increasing users' costs to communicate (Roberts 2018). Internet users are highly impatient: 57 percent of users will abandon a site if it takes more than three seconds for the webpage to load, of which 80 percent will not return (Nagy 2013). Although censorship via friction is not done by simply increasing the loading time of a website, it often increases the time needed for users to successfully post content and decipher encrypted content posted by other users. Standard practices of censorship on SNS platforms include, but are not limited to, suspending an account temporarily, deactivating an account permanently, hiding a post in the timeline with or without notifying the poster, disabling the reply/forward function for a post, adding a misinformation warning tag to a post. The increased communication cost drives active users away, possibly toward a competitor's platform. Hence it leads to a loss in profit for the platform.

In the model, the government can shut down the platform as punishment for censoring too little. This simplifying assumption captures the idea that the government punishes the platform by hurting its profitability: In reality, the government can punish platforms for disobedience in various ways, for example, by giving them a warning, collecting fines, or shutting them down, either temporarily or permanently. Toutiao ("Today's Headlines"), one of the most popular news platforms in China and a core product of ByteDance, was temporarily shut down for 24 hours in Dec. 2017 by the Cyberspace Administration of China (CAC). Four months later, it permanently shut down its popular joke app Neihan Duanzi at the request of the State Administration of Radio and Television (SART). At the same time, its CEO Yiming Zhang openly apologized to regulators and the public for allowing the app to "lose its way" and announced an increase of content moderators from 6,000 to 10,000. In 2021 Weibo paid 44 fines totaling \$2.25mn (in USD), and Douban incurred 22 fines totaling \$1.42mn. These fines themselves are not colossal relative to these companies' revenues. However, these public punishments can trigger a more significant loss. On Dec. 14th, 2021, Weibo stock hit multi-year lows after CAC fined Weibo three million yuan (\$470,000), the maximum amount of such fines, for violating cybersecurity laws and publishing illegal information repeatedly. Within one day, Weibo's stock price fell by 10%

in Hong Kong and 4.8% in the U.S. stock market. The massive drop in market value reflects the reduced confidence level of the public about the company’s future profitability.

These punishments hurt the “Big Profit” made by SNS companies and the government’s tax revenue. Take 2019 as an example: China’s total tax revenue was \$2,300 billion. Weibo paid around \$100 million in tax, while Tencent paid \$2.1 billion. The top 500 private companies jointly contributed \$200 billion in tax. The general Corporate Income Tax rate in Mainland China is fixed at 25%. While the *de facto* tax rate, which is the ratio of tax expense divided by pretax income, varies across companies and time because some preferential tax treatments apply to some companies. For example, companies that the government approves as “High and New Technology Enterprises” or “Key Software Enterprises” are subject to a preferential corporate income tax rate of 15% and 10%, respectively (PRC State Taxation Administration 2017, PRC State Taxation Administration 2022). Both Weibo and Tencent enjoyed these preferential tax treatments for the tax year 2017-2019 (recognized in the year 2018-2020). Weibo lost these benefits while Tencent managed to plow on for one more year in 2021. The model starts with an initial node where the government sets a tax rate for the platform.

2 Data

Weibo and Tencent report their censorship performance monthly on their official accounts or service centers. They are two of the largest social media service providers in China: As of Q2 2022, Weibo has 582 million monthly active users (MAU), while the two core social media services provided by Tencent, Tencent QQ and WeChat, have 569 and 1299 million MAU, respectively. The data is collected from Weibo Administrator (微博管理员), which has 135 million followers on Weibo, and Tencent Guard (腾讯卫士), which serves more than one billion WeChat users and 800 million QQ users. Figure 1 shows the self-reported number of deactivated accounts due to politically sensitive or offensive content on the two platforms. Since the two platforms are of different sizes, the numbers are normalized by each platform’s Monthly Active Users (MAU) to make the comparison meaningful. The shaded areas indicate when preferential tax benefits are

available. Figure 2 displays the ratio of the censorship level on the two platforms to the industry level of censorship. The industry level of censorship is measured by the number of cases reported to the CAC Reporting Center (中央网信办举报中心) by all websites each month, normalized by the number of internet users in China.

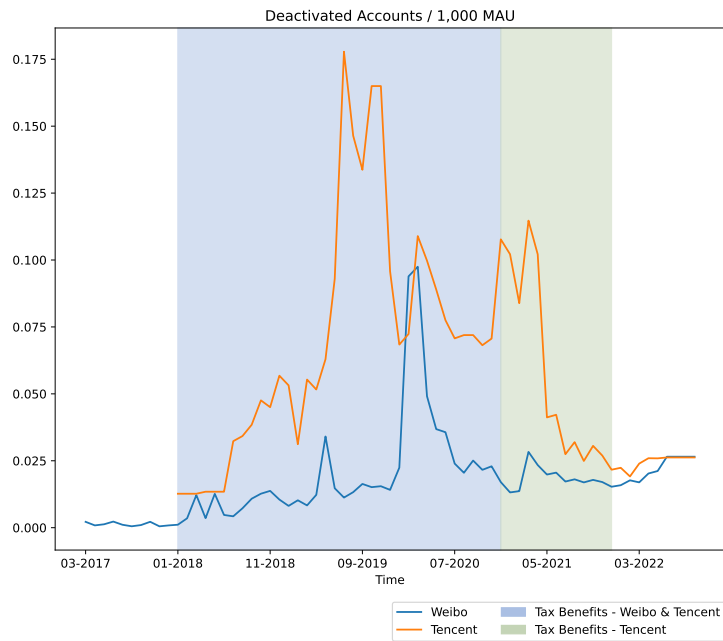


Figure 1: Frequency of Censorship by Weibo and Tencent

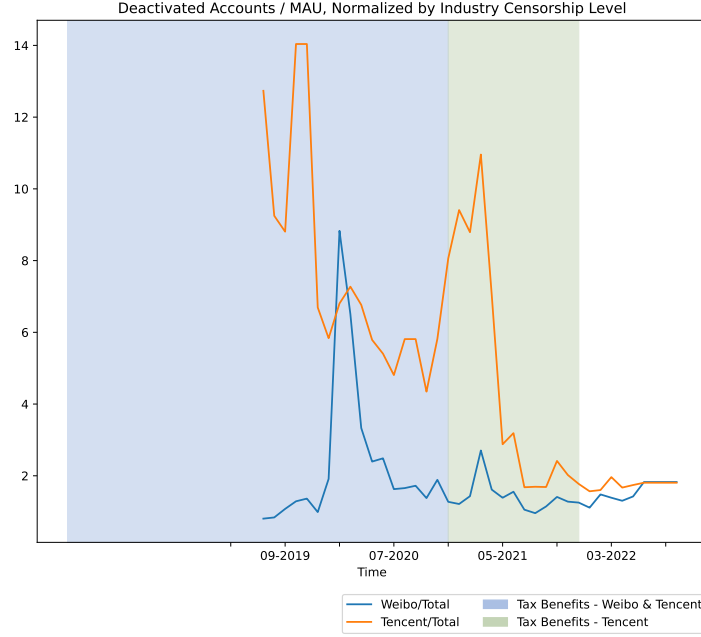


Figure 2: Frequency of Censorship by Weibo and Tencent, Compared to Industry Average

The data exhibits two noticeable trends: (i) The level of censorship by SNS companies is higher when their *de facto* tax rate is lower. (ii) Bigger SNS companies censor more frequently than smaller ones. The intuition is that the tax rate the government determines in advance affects its future incentives to punish SNS companies when the level of censorship is unsatisfying. If the government cancels some tax benefits for an SNS company, then the *de facto* tax rate is higher, implying that the government cares more about the profit made by the company. Hence the government has weaker incentives to punish the company in case of disobedience because it also hurts its revenue. Therefore, the company also has weaker incentives to comply with the government to censor content. The difference in censorship levels on SNS platforms of different sizes can be explained by stronger incentives of the government to stop circulating sensitive information on bigger SNS platforms.

3 The Model

There are two players: The government and the platform. In the first period, the government chooses and commits to a tax rate $\tau \in [0, \bar{\tau}]$ that applies to the platform in the next period. The upper bound $\bar{\tau} \in (0, 1]$ represents the highest tax rate that the government can choose. In China, $\bar{\tau} = 25\%$. The tax rate is public information. Non-strategic users of the platform spend a fixed amount of time on it and hence generate a fixed amount of profit for the platform, which is normalized as 1. The fraction of sensitive content that the users spread, denoted by α , is a random variable that follows a uniform distribution on $[0, 1]$. The distribution is public information, but the realized α is unknown to the platform. Only the government observes α in the final period. This captures the changing and private preferences of the government on political topics. In the second period, the platform chooses its compliance level, $\beta \in [0, 1]$, which measures the fraction of sensitive content the platform successfully catches. Censorship is costly: choosing a higher β incurs a higher cost for the platform. In the final period, the government decides whether to shut down the platform after observing α and β . Let $d \in \{0, 1\}$ represent the government's decision. If $d = 1$ (the government shuts down the platform), both the platform and the government get zero. If $d = 0$ (the government does not shut down the platform), the government taxes the platform's revenue at the chosen tax rate τ . Notice that, in reality, the government punishes SNS platforms for disobedience in various ways. No matter what form the punishment takes, there is one thing in common: It harms the revenue of the SNS company and the government's tax revenue. This model captures it by assuming that the government chooses whether to shut down the platform.

Figure 3 summarizes the timeline of the game:

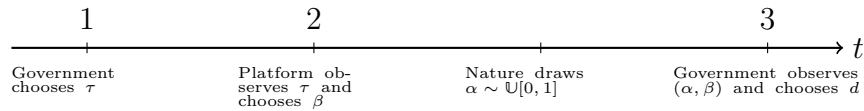


Figure 3: Timeline

If the platform is not shut down, it profits from active users and pays tax and the cost of censorship. The platform's payoff is given by

$$\Pi(\beta) = (1 - d)(1 - \tau - \kappa_1\beta),$$

where κ_1 is the coefficient of censorship cost. Notice that the censorship cost includes the hiring cost of content moderators, the reputation cost of censoring, and the loss of active users for censoring more.

Assumption 1. $\kappa_1 \in (0, 1)$.

Censorship is costly, so κ_1 must be positive. It is straightforward that the platform never censors if the cost of censorship is higher than the total revenue. This paper only focuses on the case where $\kappa_1 < 1$.

The government's payoff when $d = 0$ is given by its tax revenue minus dis-utility from the existence of sensitive content on the platform:

$$V(\tau, d) = (1 - d)[\tau - \kappa_2\alpha(1 - \beta)],$$

where κ_2 represents how much the government hates sensitive content being spread on the platform. Since the platform size is normalized, κ_2 measures the government's dis-utility from sensitive content per user. For platforms with more active users, κ_2 is higher because every post has a bigger pool of potential audience.

4 Results

4.1 Equilibrium

The solution concept is Perfect Bayesian Equilibrium.

Proposition 1. *There exists a unique equilibrium. There are four cases:*

1. *If $(1 - \kappa_1)\kappa_2 < \bar{\tau}^2$, then $\tau^* = \bar{\tau}$, $\beta^* = 0$, and $\mathbb{E}(d^*) \geq 0$ at equilibrium. There is no tax benefit or censorship. Furthermore, $\mathbb{E}(d^*) > 0$ if and only if $\bar{\tau} < \kappa_2$. A shutdown is possible if κ_2 is big enough.*
2. *If $(1 - \kappa_1)\kappa_2 > \bar{\tau}^2$, $1 - \kappa_1 > \bar{\tau}$ and $\kappa_2 < \bar{\tau}$, then $\tau^* = \bar{\tau}$, $\beta^* = 0$, and $\mathbb{E}(d^*) = 0$ at equilibrium. There is no tax benefit or censorship. The shutdown never happens.*

3. If $1 - \kappa_1 > \bar{\tau}$ and $\kappa_2 > \bar{\tau}$, then $\tau^* = \bar{\tau}$, $\beta^* = 1 - \frac{\bar{\tau}}{\kappa_2} > 0$, and $\mathbb{E}(d^*) = 0$ at equilibrium. There is no tax benefit. The platform censors just enough to make the government indifferent between shutting it down or not in the worst case (when $\alpha = 1$). The shutdown never happens.
4. If $(1 - \kappa_1)\kappa_2 > \bar{\tau}^2$ and $1 - \kappa_1 < \bar{\tau}$, then $\tau^* = 1 - \kappa_1$, $\beta^* = 1 - \frac{1 - \kappa_1}{\kappa_2} > 0$, and $d^* = 0$ at equilibrium. Tax benefits are offered. The platform censors just enough to make the government indifferent between shutting it down or not in the worst case (when $\alpha = 1$). The shutdown never happens.

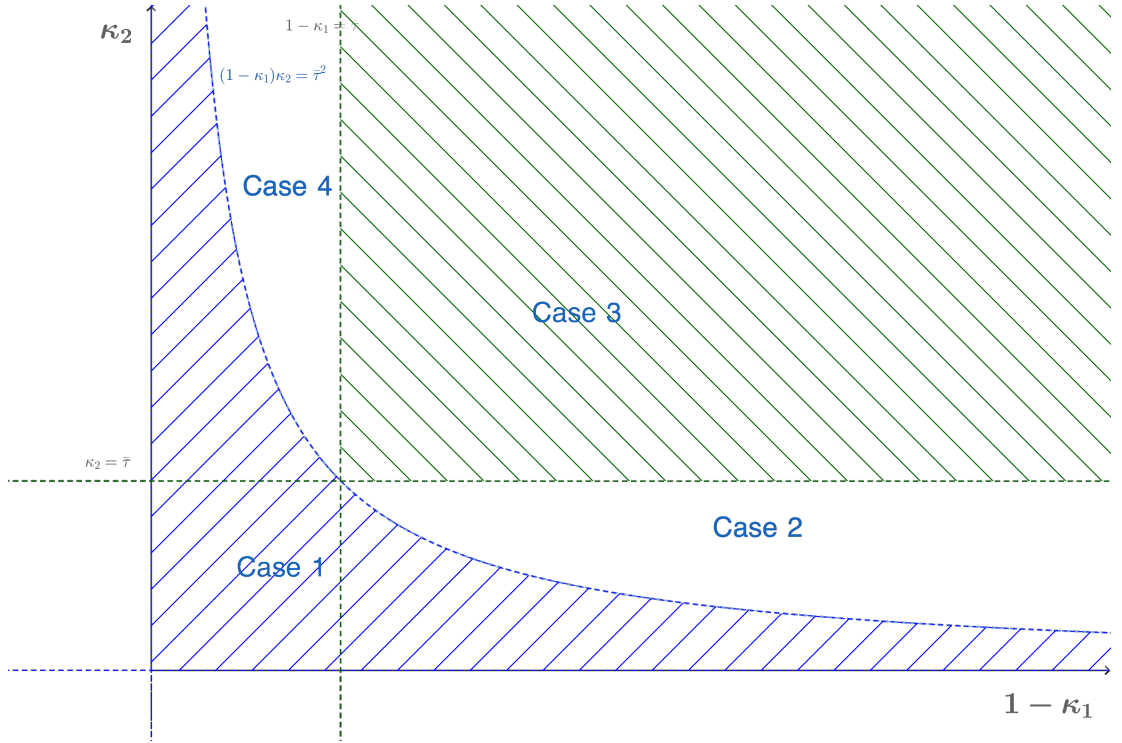


Figure 4: Unique Equilibrium - Four Cases

Figure 4 locates the four cases in the $(1 - \kappa_1) \times \kappa_2$ plane. Only in Case 4 (if censorship is costly and the government's dis-utility from sensitive content is high) the government offers tax benefits to the platform. The platform censors frequently enough to keep the government indifferent between shutting it down or not in the worst case (when $\alpha = 1$). There is always censorship on the platform,

and shutdown never happens. In the other three cases the government offers no tax benefit. The platform only censors in Case 3 where the cost of censorship is low and the government is sensitive. Shutdown happens with positive probability only in Case 1 if the government's dis-utility is high enough.

The complete proof can be found in the Appendix. The sketch of the proof is presented below. In the final period, the government's optimal strategy is to shut down the platform whenever α is too high:

$$d^*(\tau, \alpha, \beta) = \mathbb{1}(\kappa_2 \alpha (1 - \beta) > \tau) = \mathbb{1}\left(\alpha > \frac{\tau}{\kappa_2(1 - \beta)}\right).$$

Given this shutting-down strategy, the platform's expectation is then

$$1 - \mathbb{E}(d^*) = Prob\left(\alpha < \frac{\tau}{\kappa_2(1 - \beta)}\right) = \min\left\{\frac{\tau}{\kappa_2(1 - \beta)}, 1\right\}.$$

Notice that if $\tau \geq \kappa_2$, then $d^* = 0$ always and hence $\beta^* = 0$ in equilibrium. The best response function of the platform is then

$$\beta^* = \begin{cases} \tilde{\beta}, & \tau \leq 1 - \kappa_1 \text{ and } \tau \leq \kappa_2 \\ 0, & \text{otherwise,} \end{cases}$$

where

$$\tilde{\beta} = 1 - \frac{\tau}{\kappa_2}.$$

Observe that the platform censors only when the cost of censorship, κ_1 , and the tax rate, τ , are low enough. Notice that β^* is decreasing in τ : If the tax rate increases, the platform keeps a smaller share of its revenue while the government gets a bigger share. Hence the government has weaker incentives to shut down the platform, and the platform has weaker incentives to censor. The interior solution $\tilde{\beta}$ makes the government indifferent between shutting down the platform or not in the worst case (when $\alpha = 1$). The platform censors so that the government will not shut them down in the worst case. This explains the first trend observed above.

Then the government's optimal choice of τ can be found by looking at its expected payoff in the first period:

$$\tau^* = \begin{cases} 1 - \kappa_1, & \frac{\bar{\tau}^2}{\kappa_2} < 1 - \kappa_1 < \bar{\tau} \\ \bar{\tau}, & \text{otherwise} \end{cases}$$

From here, it is straightforward to derive all possible cases of equilibrium.

4.2 Comparative Statics

Proposition 2. *The equilibrium tax rate τ^* strictly decreases in κ_1 if and only if $(1 - \kappa_1)\kappa_2 > \bar{\tau}^2$ and $1 - \kappa_1 < \bar{\tau}$, and remains constant otherwise. The equilibrium censorship level β^* strictly increases in κ_1 if and only if $(1 - \kappa_1)\kappa_2 > \bar{\tau}^2$ and $1 - \kappa_1 < \bar{\tau}$, and remains constant otherwise. The equilibrium censorship level β^* strictly increases in κ_2 if and only if $(1 - \kappa_1)\kappa_2 > \bar{\tau}^2$ and $\kappa_2 > \bar{\tau}$, and remains constant otherwise.*

Notice that, by the platform's best response function, the cost of censorship, κ_1 , only affects the censorship level indirectly: Depending on high the cost of censorship is relative to the tax rate, the platform either censors so that the government is indifferent between shutting it down when $\alpha = 1$ or does not censor at all. However, κ_1 is irrelevant to the government's shutting down strategy. In Cases 1 and 2, there is no tax benefit or censorship at equilibrium. An increase in κ_1 has no effect on β^* and makes it harder for the government to incentivize censorship. Hence an increase in κ_1 leads to no change in the equilibrium τ^* and β^* . In Case 3, there is no tax benefit but censorship at equilibrium. A marginal increase in κ_1 does not change the platform's behavior: It still wants to censor to keep the government indifferent. Therefore, an increase in κ_1 leads to no change in the equilibrium τ^* and β^* . However, in Case 4, the platform is also on the edge of censoring or not. If κ_1 increases, the platform would stop censoring if nothing else is changed. Hence the government sets a lower tax rate to incentivize censorship by the platform. However, a lower tax rate amplifies the government's incentives to punish the platform as well. Therefore, it leads to an increase in the level of censorship required to keep the government indifferent. The equilibrium level of censorship increases while the equilibrium tax rate decreases. In Case 3 and 4, if the government's dis-utility from sensitive content, κ_2 , increases, the platform is forced to censor more so that the government is still indifferent between shutting it down or not in the worst case.

The difference in censorship levels on SNS platforms of different sizes (the second trend) can be explained by the positive correlation between β^* and κ_2 : The same piece of sensitive information receives more attention on a bigger platform. Hence the government dislikes sensitive content on SNS platforms with

more users. So κ_2 is higher when the SNS platform has more users; hence, the equilibrium censorship level is higher.

In July 2022, the Russian internet regulator fined Google \$370 million for promoting the dissemination of false content on YouTube. A week later, Russia fined Google \$34 million under the pretext of breaching competition rules in the video hosting market. These punishments can be interpreted as the result of the sudden increase in α and κ_2 after the Russian invasion of Ukraine. The equilibrium censorship level β^* increases, whereas Google failed to meet the Russian government's expectations.

A possible explanation for the cessation of tax benefits for Weibo but not Tencent in 2021 is a northwestern movement for both companies in the $(1-\kappa_1) \times \kappa_2$ plane. Their κ_2 increases due to continuing growth in their active users. There is a huge increase in κ_1 after the pandemic: More Chinese internet users utilize more complicated methods to escape censorship after experiencing multiple lockdowns in real life and online. Weibo has moved to the Case 1 area, while Tencent remains inside the Case 4 area because Tencent has a bigger κ_2 than Weibo.

5 Conclusion

This paper provides a simple dynamic game theory model that illustrates the interaction between social media companies and the government that wants the SNS companies to remove politically sensitive content. The key trade-off for the government is between tax revenue and censorship. The tax rate that the government approves in advance affects how the government can manage censorship by SNS companies in the future: If the tax rate is high, the threat to punish the SNS platform in case of insufficient censorship is less convincing because it also hurts the government's tax revenue more. As a result, the platform has weaker incentives to comply with the government's order to censor. The model also explains the different censorship levels on SNS platforms of different sizes. It is consistent with the observation that the smaller platform, Weibo, loses tax benefits earlier than the bigger platform, Tencent.

Appendix A: Proof of Proposition 1

Proof. In the final period, the government solves

$$\max_{d \in \{0,1\}} V(\tau, d) = (1-d) [\tau - \kappa_2 \alpha (1-\beta)].$$

Therefore, the optimal shutting down strategy is given by

$$d^*(\tau, \alpha, \beta) = \mathbb{1}(\kappa_2 \alpha (1-\beta) > \tau) = \mathbb{1}\left(\alpha > \frac{\tau}{\kappa_2(1-\beta)}\right). \quad (\text{A.1})$$

Hence the platform's expectation is

$$1 - \mathbb{E}(d^*) = \text{Prob}\left(\alpha < \frac{\tau}{\kappa_2(1-\beta)}\right) = \min\left\{\frac{\tau}{\kappa_2(1-\beta)}, 1\right\}.$$

In the second period, the platform solves

$$\begin{aligned} \max_{\beta \in [0,1]} \mathbb{E}(\Pi(\beta)) &= (1 - \mathbb{E}(d^*)) (1 - \tau - \kappa_1 \beta) \\ &= \begin{cases} \frac{\tau(1-\tau-\kappa_1\beta)}{\kappa_2(1-\beta)}, & \tau \leq \kappa_2(1-\beta) \\ 1 - \tau - \kappa_1 \beta, & \tau \geq \kappa_2(1-\beta) \end{cases} \end{aligned}$$

If $\tau > \kappa_2$, the objective function decreases with β and hence $\beta^* = 0$. Otherwise, the objective function decreases with β if $\beta \geq \tilde{\beta} = 1 - \frac{\tau}{\kappa_2} > 0$. For $\beta < \tilde{\beta}$, the objective function is monotone in β . It increases with β if and only if $\tau \leq 1 - \kappa_1$. Therefore, the platform's best response function is

$$\beta^* = \begin{cases} \tilde{\beta}, & \tau \leq 1 - \kappa_1 \text{ and } \tau \leq \kappa_2 \\ 0, & \text{otherwise.} \end{cases}$$

The government's expected payoff in the first period from choosing τ is

$$\mathbb{E}V(\tau, d^*) = \begin{cases} \int_0^1 [\tau - \alpha\tau] d\alpha = \frac{\tau}{2}, & \tau < 1 - \kappa_1 \text{ and } \tau < \kappa_2 \\ \int_0^{\frac{\tau}{\kappa_2}} [\tau - \kappa_2 \alpha] d\alpha = \frac{\tau^2}{2\kappa_2}, & 1 - \kappa_1 < \tau < \kappa_2 \\ \int_0^1 [\tau - \kappa_2 \alpha] d\alpha = \tau - \frac{\kappa_2}{2}, & \tau > \kappa_2. \end{cases}$$

Therefore the optimal τ is

$$\tau^* = \begin{cases} 1 - \kappa_1, & \frac{\bar{\tau}^2}{\kappa_2} < 1 - \kappa_1 < \bar{\tau} \\ \bar{\tau}, & \text{otherwise} \end{cases}$$

The last step is to go through all possible cases of the parameters, $(\kappa_1, \kappa_2, \bar{\tau})$, and find the corresponding τ^*, β^* and $\mathbb{E}(d^*)$. \square

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