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News Media, Digital Platforms and Content Sharing

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News Media, Digital Platforms and Content Sharing*

Geoffrey Go†

Abstract

The recent 'News Media Bargaining Code' has raised controversy as Australia attempts to force digital platforms to pay news publishers for their links and snippets. To understand the impacts of the bargaining code on both the sustainability and quality of journalism, we develop a model where there are two types of news content available to consumers: full news from the news publisher and snippets on the platform. We show that the bargaining code strictly improves the news publisher's welfare but increases their joint investment incentives if and only if the relative investment in snippets is sufficiently large. We further establish that commercial agreements are a promising alternative that strictly increases both the welfare of news publishers and the quality of their news. Our results suggest that the bargaining code is better used as an indirect threat to promote fair commercial negotiations, rather than used directly.

Keywords: advertising, online platforms, content sharing, journalism

JEL Classifications: L52, L82

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1 Introduction

The internet has significantly disrupted the economics of traditional industries through the immense growth of internet platforms. One such industry is the journalism industry, which has faced challenges in adapting its business model to a competitive, online media market. Traditionally reliant on print advertising and classified revenues, the transition to digital journalism has been difficult. The gains in online revenues have been minor compared to the substantial declines in print revenues (PwC, n.d.). It is thus unsurprising that the sustainability of quality public journalism is in question.

Moreover, the dominance of large media platforms and news aggregators has cast further doubt on the sustainability of quality public journalism. Among these dominant firms are Facebook and Google, each of which captures a significant proportion of consumer attention and advertising revenues. News publishers have often claimed that these news aggregators and platforms are stealing, and profiting off, their content. Rupert Murdoch, the founder of News Corp, likened the aggregation of news to 'theft' and accused Google of stealing from news publishers,[1] while the Associated Press expressed their frustration with how aggregators are 'appropriating their content'.[2] News Corp further argued that the appropriation of content by news aggregators and digital platforms reduces the incentives to invest in quality journalism, and original and diverse content.[3] Google and Facebook refute these claims, arguing that they provide value by driving billions of pageviews to news publishers. In Australia, Facebook drives a substantial amount of traffic to news publishers, with 15% of visits to news publisher being driven by Facebook, compared to 12% globally (Lioudis, 2021).

Concerns of a drastic bargaining imbalance between these platforms and news publishers have been raised by the Australian Competition & Consumer Commission (ACCC) in their

[1] See https://www.forbes.com/2009/04/03/rupert-murdoch-google-business-media-murdoch.html

[2] See https://www.forbes.com/2009/04/06/google-ap-newspapers-business-media-copyright.html?sh=40e334ba5542

[3] News Corp's submission to the ACCC's digital platforms inquiry can be found here: https://www.accc.gov.au/system/files/News%20Corp%20Australia%20%28April%202018%29.pdf

digital platforms inquiry (ACCC, 2019). In response, the Australian Government has introduced the "News Media Bargaining Code" (hereafter 'bargaining code') to address these bargaining imbalances and to improve the sustainability of public interest journalism. The bargaining code enables the Australian Government to designate any digital platform they deem to have an imbalance in bargaining power with news publishers. Being designated legally induces the platform to negotiate a payment to the news publishers for the use of their links and snippets. Where negotiations are unsuccessful, mandatory final-offer arbitration will occur.

There has been limited research conducted on the impacts of such a bargaining code and whether it will achieve the Australian Government's objectives. Importantly, the successful legislation of the bargaining code in Australia has inspired other Governments to consider similar policies, including Canada and the European Union.[4] We are thus motivated by a desire to launch the theoretical literature on the bargaining code and to inform both Australian and foreign governments of its implications. Such research will promote better policy making in supporting quality public journalism.

However, the bargaining code has generated substantial controversy. Facebook and Google responded by lobbying aggressively against the Australian Government. Google threatened to remove Google Search from Australia.[5] Facebook banned Australian news off the platform which prompted last minute amendments to the code.[6] Their concerns were primarily over the requirement to pay for links and snippets, the mandatory final-offer arbitration, and the requirement to provide advanced notice of any algorithm changes to news publishers. Many public submissions were made to the ACCC that expressed additional concerns, including that the bargaining code will harm smaller news publishers. While we do not address all of these concerns, the contentious debate provides further motivation to

[4]European Union: `https://www.ft.com/content/4c40c890-afd3-40a3-9582-78a66c37a8af`
Canada: `https://www.reuters.com/article/us-australia-media-facebook-canada-idUSKBN2AI349`

[5]Google's letter to Australia, 1.5 months prior to the legislation being passed, can be found here: `https://about.google/google-in-australia/jan-6-letter/`

[6]Facebook's statement on their news ban can be found here: `https://about.fb.com/news/2021/02/changes-to-sharing-and-viewing-news-on-facebook-in-australia/`

research its implications.

The central aim of this paper is to investigate how the bargaining code impacts both the sustainability and quality of journalism. Given the concerns over the sustainability of quality journalism, we are particularly interested in whether the bargaining code increases the incentives of news publishers to invest in the quality of their news. We are also interested in how a news ban, similarly to Facebook, affects these same objectives. We focus on the core feature of the bargaining code that requires any designated platform to pay for links and snippets and the mandatory final-offer arbitration.

To address these issues, we take a theoretical approach by modelling the interactions between a large digital platform (consider Facebook or Google) and a large news publisher, as well as a fringe of smaller content providers. The news publisher offers subscriptions to its full news on its own website, earning both advertising and subscription revenues from its readers. The digital platform operates an advertising-financed website that hosts its own content or services, but also hosts the news publisher's snippets and content produced by the content providers. The news publisher's snippets are modelled as an inferior alternative to their full news. To analyse how the bargaining code impacts the incentives to invest in news quality, the news publisher can jointly invest in the quality of both snippets and full news at a fixed investment cost.

All consumers are informed of the platform, but only some are initially informed of the news publisher. However, any uninformed consumers who read snippets on the platform becomes aware of the news publisher's existence and their full news. Consumers make homing choices on which service(s) to use to maximise their utility and are heterogeneous in their valuations of news quality and time costs of using the platform.

In the base case, we consider the status quo in which news sharing occurs on the platform, but the platform does not compensate the news publisher for their snippets. Using the status quo as a benchmark, we compare the outcomes against the regime where the platform chooses to ban news sharing off the platform instead of complying with the bargaining code. Lastly,

we compare the status quo against the regime under the bargaining code where negotiations or arbitration is successful. We model the bargaining code as a simple revenue sharing agreement, where the news publisher is entitled to a fraction of the platform's incremental profit from news sharing.

We find that the news publisher's profits strictly increases under the bargaining code. Moreover, the bargaining code increases the news publisher's investment in snippets, but decreases their investment in full news. We show that a joint quality investment increases if and only if the relative investment in snippets is sufficiently larger than the relative investment in full news. Further, we show that this threshold for snippet investment is relatively low. Our results highlight the importance of the news publisher's investment technologies in how the bargaining code affects their investment incentives.

Motivated by the difficulties faced by news publishers in adopting a sustainable business model, we discuss how a news publisher's business model affects our results. Compared to a subscription-based business model, an advertising-financed news publisher is more likely to benefit from news sharing and have greater investment incentives under the bargaining code. Charging a subscription fee encourages consumers to substitute between full news and snippets, which worsens the impact of news sharing.

We then extend our framework by endogenizing the content providers in our model and show that it creates another channel through which the news publisher's investments affects both the platform and itself. We also show that the integration of a 'compensation payment' in the bargaining code has desirable properties by improving both the welfare and investment incentives of news publishers who have been harmed the most from news sharing. Finally, the bargaining code is not currently being used by the Australian Government as commercial agreements are being made instead. We discuss Google's commercial agreements with news publishers, Google News Showcase, and find that it promotes both the sustainability and news quality of participating news publishers.

Our research has significant policy implications as it suggests that commercial agree-

ments may be more desirable than negotiations under the bargaining code. We find that commercial agreements strictly improve both the welfare of the news publishers and their news quality. While the bargaining code better promotes the sustainability of journalism, it has an ambiguous impact on the quality of journalism. Moreover, commercial agreements avoids the controversy and political challenges of the bargaining code, and does not require direct regulation. Our findings suggest that directly enforcing the bargaining code may not be optimal and is instead better used to induce fair commercial negotiations between digital platforms and news publishers. Foreign governments that are considering similar policies should determine whether such an approach aligns with their objectives.

2 Related Literature

The literature on the bargaining code is limited. We are aware of only one other paper by de Corniére and Sarvary (2020) that considers how the bargaining code might affect the interactions between a social media platform and news publishers. They model a monopolist social media platform that bundles user-generated content with news content from news publishers. As an extension, the authors consider the effects of the bargaining code, via Nash Bargaining, and concludes that while news publishers are better off, quality decreases in higher quality newspapers but increases in lower quality newspapers. We distinguish our paper by explicitly designing our model around the bargaining code. The policy regimes analysed in our model focuses on the outcomes of the bargaining code. Moreover, we adopt a revenue sharing agreement based on the platform's incremental profits from news sharing, instead of Nash bargaining, to capture the one-sided nature of the bargaining code. Lastly, our model distinguishes between full news and snippet quality. This is important because the bargaining code explicitly focuses on the use of links and snippets by the platform. These differences enable us to better capture the details and effects of the bargaining code. We believe that our paper contributes by launching the theoretical literature on the bargaining

code, providing a better understanding of its impacts, and providing a framework in which future research can improve upon.

Our paper is also related to the literature on news aggregators. The interactions between news aggregators and media companies have been explored in the literature with research conducted in empirical, experimental, and theoretical settings. Dellarocas et. al. (2016) takes an experimental approach by manipulating various elements of the snippets available on a news aggregator application, including snippet length and images, to determine its impact on their readers' behaviour. Their results highlight the existence of a strong substitution effect, where providing more information, and displaying an image, decreases the likelihood that readers click-through to the full article while increasing the time spent on the news aggregator. We contribute to this literature by developing a model that explains their experimental results.

The theoretical works of Jeon and Nasr (2016), Dellarocas, Katona, and Rand (2013), and de Corniére and Sarvary (2020) recognised an additional 'readership', 'traffic', or 'market expansion' effect, respectively, where news aggregators drive traffic to the media companies. Our model provides additional support towards the existence of these effects, which we denote as the 'information-creating' and 'value-appropriating' effects. News aggregators are generally modelled as facilitating the consumers' search for high quality news (Jeon & Nasr, 2016; Dellarocas, Katona, & Rand, 2013), or as reducing the consumers' cost of multihoming different news publishers (George & Hogendorn, 2012). Moreover, these theoretical works all address a similar issue of how content quality and the incentives to invest in quality are impacted by the news aggregator. In contrast to the single dimension of quality that each of these papers model, we identify two dimensions of quality by distinguishing between full news and snippet quality. This allows us to capture the idea that some consumers are satisfied with reading snippets on the platform and do not necessarily click-through to the full article.

Within the empirical literature, various disputes involving Google News have acted as

natural experiments to analyse the impacts of news aggregators. Calzada and Gill (2020) and Athey, Mobius, and Pal (2021) analysed the shutdown of Google News in Spain following a copyright law in 2014 that required Google to pay news publishers for their content. Chiou and Tucker (2017) analysed a contract dispute between Google News and the Associated Press. Each of these empirical papers provide evidence that news aggregators benefit news publishers and increases news consumption overall. In the context of our model, their results suggest that the information-creating effect dominates the value-appropriating effects. Athey, Mobius, and Pal (2021) found this to be particularly true for smaller news publishers, as they attract relatively few direct readers and thus relies heavily on the traffic driven by news aggregators.

3 Model Setup

3.1 Participants

□ **News publishers**. There are several news publishers who produce news. Among them, there is a large news publisher, denoted by M. M operates its own website where it distributes full news. Assume that there are two levels of M's news quality, denoted by $\theta_L < \theta_H$. θ_L corresponds to the quality of a snippet and θ_H corresponds to the quality of its full news. M can invest to enhance the quality of its full news by ϵ ($\theta_H + \epsilon$) and snippets by λ ($\theta_L + \lambda$) jointly at a total cost of c. M generates revenue from displaying advertisements and charging a subscription fee, $s \geq 0$.

It is reasonable to assume that an investment in news quality may enhance both snippets and full news. Even if news publishers invest purely in full news quality, they may incidentally enhance their snippet quality. Consider a full news investment that enhances the images or writing quality that may subsequently enhance the snippet text and thumbnail without an explicit investment in snippets. Regardless, we can easily separate the effects of ϵ and λ by

setting either of them to 0.[7]

There are also a large number of small content providers, denoted by CPs. CPs do not have their own distribution channel and cannot charge subscription fees. They can only distribute their content on a platform P, which is specified below, by incurring an entry cost. Potentially, CPs can receive revenue from displaying ads embedded in their content.

We assume that the subscription fee, s, is exogenously given. However, we can endogenize s by considering competition between two homogeneous media companies, M and $\tilde{M}$. Suppose M and $\tilde{M}$ are located on a Hotelling line of unit length. Let the consumers be uniformly distributed on the Hotelling line and they can subscribe to one of the two companies. A consumer incurs a transportation cost $d\delta$ if she joins a media company with distance d, where δ represents the transportation cost parameter. Applying the standard Hotelling analysis concludes that the companies will set the symmetric equilibrium subscription fee equal to δ. Introducing such competition would not affect our analysis except relabelling some parameters. We therefore focus on the setting with one large news publisher and an exogenous subscription fee.

□ **Digital platform**. An advertising-financed digital platform (e.g. Google or Facebook), denoted by P, provides its users with utility v. Let $v \equiv v_0 + v_{\text{cp}}$, where v_0 is a fixed standalone value (e.g. from using Google's search engine or social networking on Facebook), and v_{cp} is the value generated by reading content created by CPs. In addition, news produced by M might be shared on P, which will take the form of a snippet with quality θ_L. We refer to the availability of snippets, and content from CPs, on P as *news sharing*.

□ **Consumers**. There is a unit mass of consumers who are heterogeneous in two dimensions:

- Consumers differ in how much they value the quality of the news they read. We use t to represent the utility that consumers derive per unit of quality and assume that t is

[7]In reality, news publishers cannot edit the snippets on both Facebook and Google as the snippets are automatically created based on the meta-data of the full news. Snippet quality is therefore derived from the full news quality and can only be improved (automatically) through an investment in full news. While a joint investment better reflects reality, we still consider the implications of a separate investment in either full news or snippets.

uniformly distributed on $[0, 1]$.

- Consumers differ in their time costs of using P's website. We use γ to capture this heterogeneity and assume that γ is uniformly distributed on $[0, \overline{\gamma}]$ with the density equal to 1. We further assume that $\overline{\gamma}$ is sufficiently large (in particular, $\overline{\gamma} > v$).

We need t to capture the idea that some consumers will no longer read M if snippets are available on P, and we need γ to capture the idea that not all consumers want to use the platform, but will want to use it when news is shared on P. Additionally, consumers need to pay a subscription fee, s, to read full news on M.

Initially, only a fraction α of consumers are aware that M exists. We refer to these consumers as 'informed consumers', and the other $1 - \alpha$ consumers as 'uninformed consumers'. Some consumers who would benefit from reading full news may not do so because they are unaware that it is available. However, if M's snippets are shared on P, we assume that all platform users will read the snippets and become aware of M's existence. These consumers will then read full news if they have a sufficiently high valuation of news, t. We refer to any consumers who are aware of M's existence as 'aware consumers', whether they are initially aware (informed) or become aware by reading their snippets. This allows us to distinguish between 'informed' and 'aware' consumers.

□ **Advertisers**. Consider a representative advertiser who advertises on both M's and P's website (and potentially in CPs' content). If a website attracts N visits, the advertiser is willing to pay aN, with $a > 0$.

3.2 Policy Regimes

We analyse the model under three policy regimes:

1. **Status Quo**. This is the baseline scenario where snippets and other content from CPs are shared on the platform and no payments are made between P and M. CPs share their content on P and derive their entire readership from P's users.
2. **News Ban**. The platform owner bans any news sharing on the platform. Snippets

are no longer available on the platform, and CPs no longer operate. Consumers may still read full news on M's website if they are informed.

3. **News Media Bargaining Code**. The platform owner allows news sharing on the platform but pays a fee to M.

The news ban regime arises when negotiations between P and M are unsuccessful, where P refuses to comply with the bargaining code and instead chooses to ban news sharing. The bargaining code regime arises when P agrees to pay M for their content, whether through successful negotiations or through arbitration. We do not model the negotiation or arbitration process. Instead, we assume that negotiations are either successful or unsuccessful, leading to either the bargaining code or news ban regime, respectively.[8]

3.3 Timing

The timing of the status quo is as follows:

1. M chooses whether to invest in higher quality news to maximise profit.
2. Consumers make joining decisions.
    - Informed consumers: They observe their type t, γ, and the subscription fee s, and decide whether they will use P and/or M to maximise their utility.
    - Uninformed consumers: They observe γ and decide whether to use P. If they do, they become aware of M's existence and will observe t and the fee s, and then decide whether to use M.[9]
3. Advertisers observe the number of consumers using the platform, N_P, and the number of readers of M, N_M. Advertiser pays aN_P to P and aN_M to M.

[8]Explicitly modelling the negotiation or arbitration process would not affect our results. If negotiations are unsuccessful such that M and P go through mandatory arbitration, P will either agree to pay the amount determined by the arbitration panel (bargaining code regime), or refuse to pay and ban news sharing (news ban regime). Moreover, there are costs associated with undertaking arbitration. If P intends to comply with the bargaining code and pay M, applying backwards induction suggests that M and P will never reach the arbitration stage to avoid these costs.

[9]The assumption that uninformed consumers observe t only once they are on P is compatible with the fact that uninformed consumers do not know the existence of M and are therefore likely to be inattentive to their valuation of news quality.

4 Analysis

In this section, we solve the model while assuming that the subscription fee s is exogenously given, presumably due to media competition. We will sequentially derive the equilibrium outcomes under the three policy regimes and then make the comparisons.

4.1 Status Quo

Under the status quo, M's snippets and the CPs' content are shared on P, which increases the utility derived from using the platform. Informed consumers can decide whether to use P and/or M simultaneously. We say that a consumer singlehomes on P if she only uses P, singlehomes on M if she only uses M, and multihomes if she uses both P and M. The utility derived from each of the homing choices are given in Table 1.

Homing Choice	**Utility**
M	$u_M = t\theta_H - s$
P	$u_P = v + t\theta_L - \gamma$
M + P	$u_{M+P} = v + t\theta_H - \gamma - s$

Table 1: Consumers' utility from each homing choice under the status quo

Consumers view M and P as substitutes in that the utility derived from multihoming is strictly smaller than the total utility of singlehoming on both P and M. When consumers multihome, they enjoy the utility from M's full news, but no longer derives any utility from the snippets on P. Because informed and uninformed consumers differ in their awareness of M, we must consider their homing choices separately.

□ **Informed Consumers.** We first derive the homing choices of informed consumers. We define $\Delta\theta \equiv \theta_H - \theta_L$ as the incremental quality of reading full news over snippets. An informed consumer chooses singlehoming on M if $u_M \geq \max\{u_P, u_{M+P}, 0\}$, which implies

$$t \geq \frac{s}{\theta_H},\ v < \gamma,\ \text{and}\ t\Delta\theta - s - v + \gamma \geq 0, \tag{1}$$

singlehoming on P if $u_P \geq \max\{u_M, u_{M+P}, 0\}$, which implies

$$t \leq \frac{s}{\Delta\theta},\ v + t\theta_L - \gamma \geq 0,\ \text{and}\ t\Delta\theta - s - v + \gamma \leq 0, \tag{2}$$

or mutihoming if $u_{M+P} \geq \max\{u_M, u_P, 0\}$, which implies

$$v \geq \gamma,\ t \geq \frac{s}{\Delta\theta},\ \text{and}\ v + t\theta_H - s - \gamma \geq 0. \tag{3}$$

Using the conditions in (1), (2), and (3), we can depict the choices of informed consumers in the following $\gamma - t$ coordinate in Figure 1.

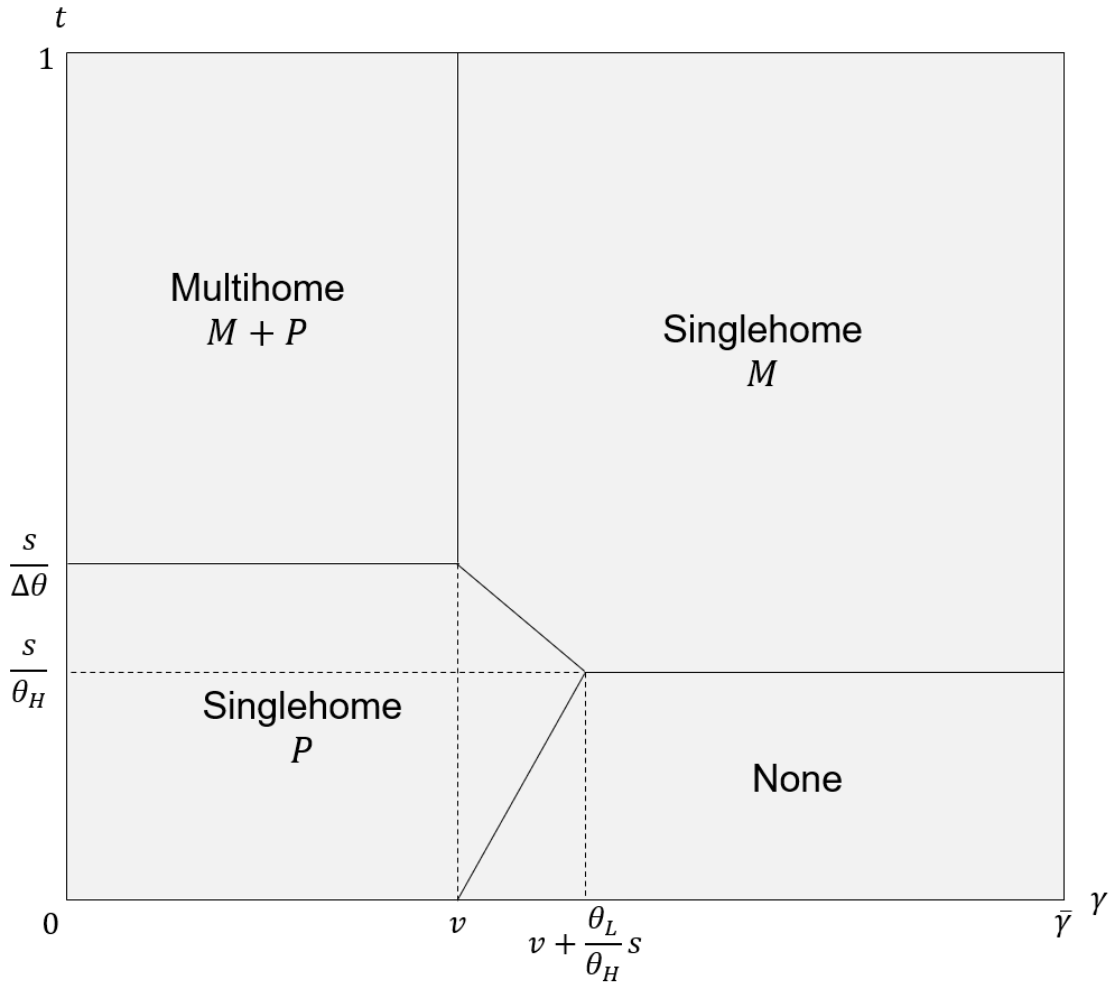

Figure 1: Homing choices of informed consumers under the status quo

Intuitively, consumers with a low cost of using the platform, γ, will use P, while consumers

with a high valuation of news, t, will subscribe to M's full news. Consumers with both a low γ and high t will multihome. From Figure 1, among the informed consumers,

$$n_{M+P}^{I} = \alpha \left(1 - \frac{s}{\Delta\theta}\right) v$$

of them multihome on M and P,

$$n_{M}^{I} = \alpha \left[\left(1 - \frac{s}{\theta_H}\right)(\overline{\gamma} - v) - \frac{1}{2}\frac{\theta_L s}{\theta_H}\left(\frac{s}{\Delta\theta} - \frac{s}{\theta_H}\right)\right]$$

of them singlehome on M, and

$$n_{P}^{I} = \alpha \left[\left(\frac{s}{\Delta\theta}\right) v + \frac{1}{2}\left(\frac{s}{\Delta\theta}\right)\left(\frac{\theta_L s}{\theta_H}\right)\right]$$

of them singlehome on P.

□ **Uninformed Consumers.** Uninformed consumers are unaware of M's existence but expect to read snippets if they use P. Their only decision initially is whether to use P with an expected utility of $v + \frac{\theta_L}{2} - \gamma$ given that t is uniformly distributed on $[0, 1]$. This implies that a fraction $v + \frac{\theta_L}{2}$ of uninformed consumers will use P. Once they are on P, they will read the snippets and realize the existence of M, and then decide whether to subscribe to M. Consumers will subscribe if $t\Delta\theta - s \geq 0$, hence a fraction $1 - \frac{s}{\Delta\theta}$ of uninformed consumers will subscribe to M. Therefore, a fraction

$$n_{M+P}^{U} = (1 - \alpha)\left(1 - \frac{s}{\Delta\theta}\right)\left(v + \frac{\theta_L}{2}\right)$$

of consumers multihome, and

$$n_{P}^{U} = (1 - \alpha)\left(\frac{s}{\Delta\theta}\right)\left(v + \frac{\theta_L}{2}\right)$$

of consumers singlehome on P.

□ **Demand and Profit.** In total, P's demand in the status quo is $N_P^{sq} = n_P^I + n_{M+P}^I +$

$n_P^U + n_{M+P}^U$, which is equivalent to

$$N_P^{sq}(v, \theta_L, \theta_H) = v + \frac{1}{2}\alpha\left(\frac{s}{\Delta\theta}\right)\left(\frac{\theta_L s}{\theta_H}\right) + \frac{(1-\alpha)\theta_L}{2}. \tag{4}$$

M's demand is $N_M^{sq} = n_M^I + n_{M+P}^I + n_{M+P}^U$, which is equivalent to

$$\begin{aligned} N_M^{sq}(v, \theta_L, \theta_H) = [v + \alpha(\overline{\gamma} - v)] + (1-\alpha)\frac{\theta_L}{2} - \left[v + (1-\alpha)\frac{\theta_L}{2}\right]\left(\frac{s}{\Delta\theta}\right) \\ - \alpha(\overline{\gamma} - v)\frac{s}{\theta_H} - \frac{\alpha(\theta_L s)^2}{2(\Delta\theta)(\theta_H)^2}. \end{aligned} \tag{5}$$

We use $N_M^{sq}(v, \theta_L, \theta_H)$ to emphasize that M's readership depends on the value created by P (v), the value that P appropriates from M's content via snippets (θ_L), and M's investment in full news quality (θ_H). The advertising revenues received by P and M are aN_P^{sq} and aN_M^{sq}, respectively, and M earns an additional sN_M^{sq} in subscription revenue. Therefore, P's profit is simply given by

$$\pi_P^{sq} = aN_P^{sq}(v, \theta_L, \theta_H) = a\left[v + \frac{1}{2}\alpha\left(\frac{s}{\Delta\theta}\right)\left(\frac{\theta_L s}{\theta_H}\right) + \frac{(1-\alpha)\theta_L}{2}\right], \tag{6}$$

and M's profit is given by

$$\pi_M^{sq} = (a+s)N_M^{sq}(v, \theta_L, \theta_H). \tag{7}$$

To understand the impact of news sharing, let us analyse how an increase in θ_L impacts M's demand in (5). The first term in (5) is a constant. An increase in θ_L in the second term increases N_M^{sq}, while an increase in θ_L in all other terms decreases N_M^{sq}. News sharing harms M through three channels. First, news sharing on P causes more informed consumers to prefer singlehoming on P instead of on M. Moreover, it reduces the informed consumers' probability of multihoming as news sharing makes M and P imperfect substitutes. Finally, it reduces the uninformed consumers' probability of subscribing to M after they join P. Consumers who read snippets are less likely to subscribe to full news because the marginal utility of reading full news decreases after deriving utility from the snippets. We call these negative effects *value-appropriating* effects. The positive effect on N_M^{sq} comes from the fact that news sharing attracts more uninformed consumers to join P who then becomes aware

of M. Those with sufficiently high t will then subscribe to M. We call this positive effect the *information-creating* effect.

Lemma 1. *Suppose the subscription fee s is exogenously given. The value of snippets on P increases M's demand, and therefore profit, if and only if*

$$-2vs(\theta_H)^2 - \alpha s^2\theta_L(2\theta_H - \theta_L) + (1-\alpha)(\theta_H)^2[(\theta_H - \theta_L)^2 - s\theta_H] > 0. \tag{8}$$

An investment made by M in full news increases θ_H and M's demand.

To satisfy (8), it is necessary that $(\theta_H - \theta_L)^2 - s\theta_H$ is both positive and sufficiently large. Otherwise, the LHS of (8) will always be negative. Specifically, (8) is likely to hold if the parameters s, v, and α are small. A lower v will cause some consumers who would otherwise singlehome on P to instead singlehome on M, mitigating the value-appropriating effects. A small α implies that a large fraction of consumers are uninformed, which strengthens the information-creating effect and weakens the value-appropriating effects.

□ **Investment Incentives.** Finally, we consider M's investment incentive. Because the subscription fee is exogenous, M's only decision is whether to invest in the quality of their news. If M does not invest, its profit is

$$(a+s)N_M^{sq}(v, \theta_L, \theta_H).$$

If M invests, its profit is

$$(a+s)N_M^{sq}(v, \theta_L + \lambda, \theta_H + \epsilon) - c.$$

Therefore, we have the following proposition.

Proposition 1. *In the status quo, M invests in news quality if and only if*

$$(a+s)(N_M^{sq}(v, \theta_L + \lambda, \theta_H + \epsilon) - N_M^{sq}(v, \theta_L, \theta_H)) \geq c. \tag{9}$$

According to Lemma 1, $N_M^{sq}(v, \theta_L + \lambda, \theta_H + \epsilon)$ increases in θ_H, but may either increase or

decrease in θ_L. Therefore, (9) is more likely to hold if ϵ is sufficiently large. We can rewrite (9) as

$$(a+s)\left(\begin{array}{c}\alpha(\overline{\gamma}-v)\left(\frac{s}{\theta_H}-\frac{s}{\theta_H+\epsilon}\right)+\frac{(1-\alpha)}{2}\lambda+v\left(\frac{s}{\Delta\theta}-\frac{s}{\Delta\theta+\epsilon-\lambda}\right)\\ +\frac{(1-\alpha)}{2}\left[\frac{s\theta_L}{\Delta\theta}-\frac{s(\theta_L+\lambda)}{\Delta\theta+\epsilon-\lambda}\right]+\frac{\alpha s^2}{2}\left[\frac{(\theta_L)^2}{\Delta\theta(\theta_H)^2}-\frac{(\theta_L+\lambda)^2}{(\Delta\theta+\epsilon-\lambda)(\theta_H+\epsilon)^2}\right]\end{array}\right)\geq c. \tag{10}$$

M will invest if the marginal revenue from investing in quality is at least equal to its cost of investment.

4.2 News Ban

The news ban regime arises when P refuses to pay M under the bargaining code and chooses to ban news sharing off the platform instead, including content from both M and CPs. As before, we first consider the informed consumers' homing decisions. If an informed consumer singlehomes on M, her utility is the same as u_M in Table 1. If she singlehomes on P, her utility is now

$$u_P = v_0 - \gamma. \tag{11}$$

Compared to u_P in Table 1, the consumer loses the content value of both v_{cp} and $t\theta_L$. However, the consumer can still enjoy $t\theta_H$ if they multihome on both M and P.

$$u_{M+P} = v_0 + t\theta_H - s - \gamma. \tag{12}$$

By comparing u_M in Table 1, (11) and (12), we can derive the conditions under which informed consumers make a specific homing choice. Consumers singlehome on M if and only if $u_M \geq \max\{u_P, u_{M+P}, 0\}$, which implies

$$t\theta_H - v_0 - s + \gamma > 0,\ v_0 - \gamma < 0,\ \text{and } t\theta_H - s \geq 0,$$

singlehome on P if and only if $u_P \geq \max\{u_M, u_{M+P}, 0\}$, which implies

$$t\theta_H - v_0 - s + \gamma < 0,\ t\theta_H - s < 0,\ \text{and } v_0 - \gamma \geq 0,$$

or multihomes on both M and P if and only if $u_{M+P} \geq \max\{u_M, u_P, 0\}$, which implies

$$v_0 - \gamma \geq 0,\ t\theta_H - s \geq 0,\ \text{and}\ v_0 + t\theta_H - s - \gamma \geq 0.$$

Based on the conditions above, we depict the homing choices of informed consumers in the $\gamma - t$ coordinate in Figure 2 below.

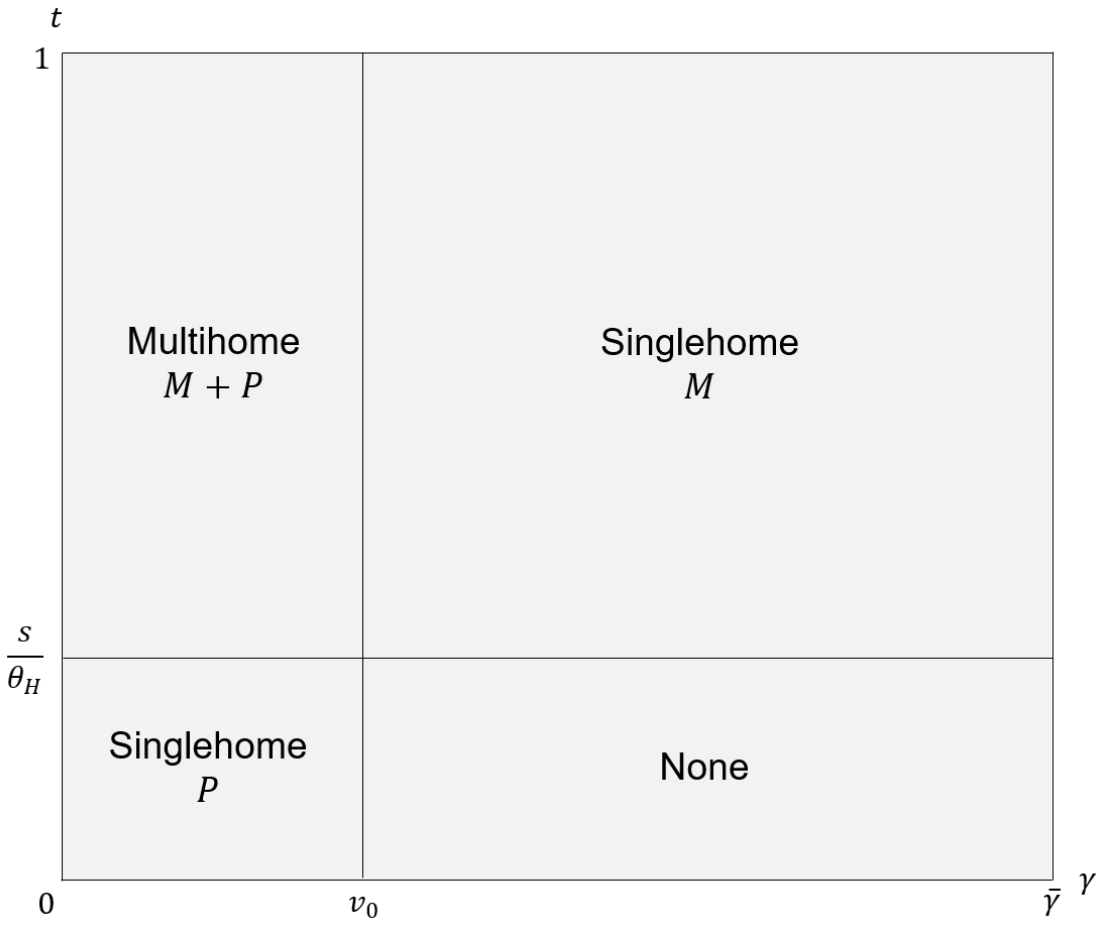

Figure 2: Homing choices of informed consumers under the news ban

From Figure 2, among the informed consumers,

$$n_M^I = \alpha \left(1 - \frac{s}{\theta_H}\right)(\overline{\gamma} - v_0)$$

of them will singlehome on M,

$$n_P^I = \alpha v_0 \frac{s}{\theta_H}$$

of them will singlehome on P, and lastly,

$$n^I_{M+P} = \alpha v_0 \left(1 - \frac{s}{\theta_H}\right)$$

of them will multihome on M and P. Among the uninformed consumers, those with $v_0 - \gamma \geq 0$ will use P. However, under the news ban, uninformed consumers who use P no longer become aware of M due to the absence of M's snippets. The number of uninformed consumers who singlehome on P is thus

$$n^U_P = (1 - \alpha)v_0.$$

P's demand is $N^{nb}_P = n^I_P + n^I_{M+P} + n^U_P$, which is equivalent to

$$N^{nb}_P(v_0) = v_0, \tag{13}$$

and M's demand is $N^{nb}_M = n^I_M + n^I_{M+P}$, which is equivalent to

$$N^{nb}_M(\theta_H) = \alpha\overline{\gamma}\left(1 - \frac{s}{\theta_H}\right). \tag{14}$$

From (13) and (14), P's equilibrium profits under the news ban is given by

$$\pi^{nb}_P = av_0, \tag{15}$$

while M's profits are given by

$$\pi^{nb}_M = (a + s)\alpha\overline{\gamma}\left(1 - \frac{s}{\theta_H}\right). \tag{16}$$

Under the news ban, P no longer affects M's demand, which is now independent of v and θ_L. Both the value-appropriating effects and the information-creating effect no longer exists under a news ban.

□ **Investment Incentives.** As before, we determine M's investment incentives by comparing their profit with and without the quality investment. Because there are no snippets on P, the investment will only increase the quality of M's full news.[10] M's profit is (16) if it

[10]Despite the lack of a snippet investment, it is reasonable to compare the marginal revenue of a full news

does not invest, and $(a+s)N_M^{nb}(\theta_H+\epsilon)-c$ if it invests.

Proposition 2. *When news sharing is banned, M invests in news quality if and only if*

$$(a+s)(N_M^{nb}(\theta_H+\epsilon)-N_M^{nb}(\theta_H))\geq c. \tag{17}$$

We can rewrite (17) as

$$(a+s)\alpha\overline{\gamma}\left(\frac{s}{\theta_H}-\frac{s}{\theta_H+\epsilon}\right)\geq c. \tag{18}$$

(18) can then be written as $\epsilon\geq\frac{c(\theta_H)^2}{s(a+s)\alpha\overline{\gamma}-c\theta_H}$, which holds automatically if $s(a+s)\alpha\overline{\gamma}-c\theta_H<0$.

4.3 News Media Bargaining Code

Under the bargaining code, a fixed transfer from P to M will not change anything in the status quo except it shifts some of P's profit to M. We move away from this trivial case by modelling the bargaining code through a revenue sharing agreement, where P's payment is contingent on their incremental profit from news sharing. P's incremental profit is determined by the difference in their profits under the status quo and the news ban regimes. Specifically, we assume that P must pay a fraction $\beta\in(0,1)$ of its incremental profit to M and can keep the remaining fraction $1-\beta$. Revenue-contingent payment is reasonable given that M and P are likely to renegotiate on the terms every few years. Moreover, the bargaining code explicitly requires the platform and news publisher to determine a dollar value of the news content distributed on the platform. It is reasonable to assume that this dollar value will depend on the platform's own benefit from news sharing.

The agreement does not affect the utility derived from any homing choices. Once an agreement is reached between P and M, the equilibrium homing choices and demand are the same as in the status quo. Comparing (6) and (16), P's incremental profit from news

investment under the news ban with the marginal revenue of a joint quality investment under the status quo. We implicitly assume that a snippet investment is costless because the quality of snippets is automatically updated based on the quality of full news.

sharing is

$$\Delta\pi_P \equiv \pi_P^{sq} - \pi_P^{nb} = a\left[v_{\text{CP}} + \frac{1}{2}\alpha\left(\frac{s}{\Delta\theta}\right)\left(\frac{\theta_L s}{\theta_H}\right) + \frac{(1-\alpha)\theta_L}{2}\right], \tag{19}$$

which M receives a share of β. Combining (7) with (19), M's profit under the bargaining code is

$$\pi_M^{bc}(v,\theta_L,\theta_H) = \pi_M^{sq}(v,\theta_L,\theta_H) + a\beta\left[v_{\text{CP}} + \frac{1}{2}\alpha\left(\frac{s}{\Delta\theta}\right)\left(\frac{\theta_L s}{\theta_H}\right) + \frac{(1-\alpha)\theta_L}{2}\right]. \tag{20}$$

Combining (6) with (19), P's profit under the bargaining code is

$$\pi_P^{bc}(v,\theta_L,\theta_H) = \pi_P^{sq}(v,\theta_L,\theta_H) - a\beta\left[v_{\text{CP}} + \frac{1}{2}\alpha\left(\frac{s}{\Delta\theta}\right)\left(\frac{\theta_L s}{\theta_H}\right) + \frac{(1-\alpha)\theta_L}{2}\right]. \tag{21}$$

We can interpret the bargaining code as increasing the bargaining power of M, which is represented by the share β of P's incremental profit that M is entitled to. Under the status quo, M has effectively no bargaining power to induce P to pay for the use of their snippets, which implies that $\beta = 0$. Due to the mandatory first-offer arbitration, the bargaining code increases M's bargaining power such that $\beta > 0$.

□ **Investment Incentives.** M's investment incentives under the bargaining code are again determined by comparing its profit with and without the quality investment. This gives the following proposition.

Proposition 3. *Under the news media bargaining code, M invests in news quality if and only if*

$$\begin{aligned}(a+s)(N_M^{sq}(v,\theta_L+\lambda,\theta_H+\epsilon) - N_M^{sq}(v,\theta_L,\theta_H)) \\ + a(1-\beta)(N_P^{sq}(v,\theta_L+\lambda,\theta_H+\epsilon) - N_P^{sq}(v,\theta_L,\theta_H)) \geq c.\end{aligned} \tag{22}$$

4.4 Comparison and Discussion

In this section, we compare the equilibrium outcomes across the three policy regimes using the status quo as a benchmark.

4.4.1 Status Quo vs News Ban

To determine the impacts of a news ban, we compare our results under the news ban regime with the results under the status quo.

□ **Demand and Profit.** First, we consider how a news ban affects M's demand. By comparing (4) and (5), $N_M^{sq} > N_M^{nb}$ if and only if

$$N_M^{sq} - N_M^{nb} = \underbrace{\left[v + (1-\alpha)\frac{\theta_L}{2}\right]\left(1 - \frac{s}{\Delta\theta}\right)}_{\text{Information-creating effect}} - \underbrace{\alpha v\left(1 - \frac{s}{\theta_H}\right)\frac{\alpha(\theta_L s)^2}{2(\Delta\theta)\theta_H^2}}_{\text{Value-appropriating effects}} > 0. \tag{23}$$

(23) tells us that M will benefit from news sharing if the *information-creating* effect dominates the *value-appropriating* effects. Equivalently, M is worse-off if the *value-appropriating* effects dominate the *information-creating* effect. Such a result is unsurprising and consistent with the findings of other researchers on the impacts of news aggregation (Jeon & Nasr, 2016; Dellarocas, Katona, & Rand, 2013; de Cornière & Sarvary, 2020).

Second, we consider P's demand by comparing (4) and (13). P's incremental demand from news sharing is given by

$$N_P^{sq} - N_P^{nb} = v_{\text{CP}} + \frac{1}{2}\alpha\left(\frac{s}{\Delta\theta}\right)\left(\frac{\theta_L s}{\theta_H}\right) + \frac{(1-\alpha)\theta_L}{2} > 0, \tag{24}$$

which is strictly positive. We find that P benefits from news sharing such that they are unambiguously worse-off under the news ban. The loss of news content reduces the consumers' utility from using P and thus reduces P's demand.

□ **Investment Incentives.** Next, consider the impact of a news ban on M's investment incentives relative to the status quo. We can compare (17) with (9) to determine how a news ban affects the marginal revenue of quality investment.[11] We obtain the following proposition.

Proposition 4. *A news ban increases M's investment incentives if the value-appropriating effects on investment dominates the information-creating effects on investment, and decreases*

[11] The derivation can be found in the Appendix.

M's investment incentives if the information-creating effects on investment dominates the value-appropriating effects on investment.

Although an investment in θ_H strictly increases demand and revenue, the extent to which demand increases from this investment differs under the news ban regime. We find that there are two effects that snippets have on M's investment. First, snippets can strengthen the increase in demand by increasing the number of aware consumers to convert into subscribers. We call this the *information-creating effects on investment*. Second, snippets provide consumers with a free, low quality substitute of full news. Consumers who read snippets will therefore require a larger increase in θ_H to induce them to subscribe to full news. We call this the *value-appropriating effects on investment*.

We find that a news ban has an ambiguous impact on M's investment incentives. Under the news ban, both of these effects are lost as snippets are no longer available on the platform. M's investment incentives are lower under the news ban if the information-creating effects on investment dominate the value-appropriating effects on investment, and are higher if the value-appropriating effects on investment dominates the information-creating effects on investment.

Using a numerical example, we plot the condition (A.2) in a $\epsilon - \lambda$ coordinate in Figure 3 by setting $v = 0.3$, $s = 0.2$, $\alpha = 0.5$, $\theta_H = 0.5$, and $\theta_L = 0.1$. Consider an investment where $\epsilon = 0.1$, which represents a 20% increase in the quality of full news. The value-appropriating effects on investment will dominate if $\lambda > 0.1$, which represents a 100% increase in the quality of snippets.

While there is technically a range of ϵ and λ values where the value-appropriating effects on investment dominates, the relative investment in snippets required is extremely large. This suggests that the information-creating effects on investment will dominate for most reasonable levels of investment. In this case, M's investment incentives will decrease under the news ban because M is no longer able to attract demand from uninformed consumers.

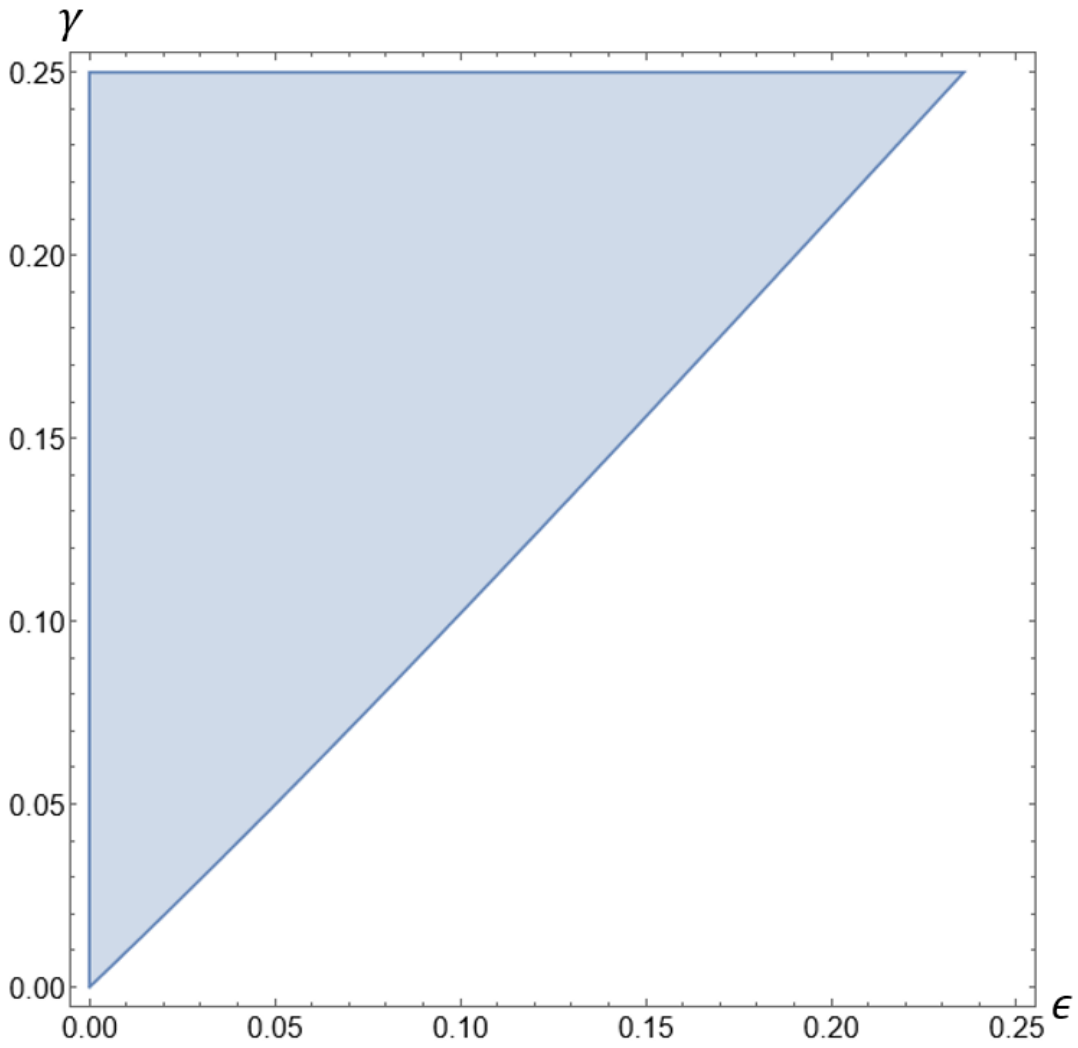

Figure 3: Joint quality investments and investment incentives under the news ban

4.4.2 Status Quo vs News Media Bargaining Code

The key focus of our paper is to determine how the bargaining code impacts the sustainability and quality of journalism. Similar to the news ban, we can evaluate these impacts by comparing our results under the bargaining code regime with our results under the status quo.

□ **Demand and Profit.** By taking the difference between (7) and (20), the only change in M's profit is the share of P's incremental profit that M is entitled to under the bargaining

code, given by

$$\Delta\pi_M = \pi_B^{bc} - \pi_B^{sq} = a\beta\left[v_{\text{CP}} + \frac{1}{2}\alpha\left(\frac{s}{\Delta\theta}\right)\left(\frac{\theta_L s}{\theta_H}\right) + \frac{(1-\alpha)\theta_L}{2}\right] > 0.$$

Clearly, M is strictly better off under the bargaining code at the expense of P.

□ **Investment Incentives.** Importantly, we determine whether the bargaining code increases M's incentives to invest in news quality. Comparing (22) with (9), we obtain the following result.

Proposition 5. *The news media bargaining code increases M's investment in snippets, but decreases M's investment in full news. The news media bargaining code increases M's joint investment in snippets and full news if and only if the relative investment in snippets is sufficiently larger than the relative investment in full news.*

Proof of Proposition 5. The news media bargaining code increases M's investment incentive if and only if

$$N_P^{sq}(v, \theta_L + \lambda, \theta_H + \epsilon) - N_P^{sq}(v, \theta_L, \theta_H) > 0, \tag{25}$$

which implies that P's demand must increase from the quality investment. We can rewrite (25) as

$$\frac{1}{2}\alpha s^2\left[\frac{\theta_L + \lambda}{(\theta_H + \epsilon)(\theta_H - \theta_L + \epsilon - \lambda)} - \frac{\theta_L}{\theta_H(\theta_H - \theta_L)}\right] + \frac{(1-\alpha)}{2}\lambda > 0. \tag{26}$$

Although the second term of (26) is strictly positive, the first term may be positive or negative depending on the values of ϵ and λ. The first term of (26) therefore determines whether this condition holds. If the first term is positive, (26) always holds. We can rewrite (26) as

$$\frac{1 + \%\Delta\theta_L}{(1 + \%\Delta\theta_H)[1 + \%\Delta(\theta_H - \theta_L)]} > 1 - \frac{(1-\alpha)\theta_H}{\alpha s^2 \theta_L}(\theta_H - \theta_L)\lambda, \tag{27}$$

where $\%\Delta\theta_L = \frac{\lambda}{\theta_L}$, $\%\Delta\theta_H = \frac{\epsilon}{\theta_H}$, and $\%\Delta(\theta_H - \theta_L) = \frac{\epsilon - \lambda}{\theta_H - \theta_L}$.

If we assume that $\epsilon > \lambda$,[12] that is, the incremental improvement in quality is greater for

[12]This is reasonable as the full news quality is typically much greater than the snippet quality. An increase

full news than for snippets, this implies that $\%\Delta(\theta_H - \theta_L) > 0$. The assumption that $\epsilon > \lambda$ refers to the absolute increase in quality, while the condition in (27) relates to the relative percentage change in quality. Therefore, for (27) to hold, the percentage increase in θ_L must be sufficiently large compared to the percentage increase in θ_H from the investment. The RHS of (27) is strictly less than 1, implying that the relative snippet investment does not need to be substantial for (27) to hold. Because a joint investment from M increases both the quality of full news and snippets, the investment has two effects.

□ **Full News.** Holding θ_L and s fixed, we partially differentiate N_P^{sq} with respect to θ_H:

$$\frac{\partial N_P^{sq}}{\partial \theta_H} = -\frac{1}{2}\alpha\theta_L s^2 \left[\frac{2\theta_H - \theta_L}{\theta_H^2(\Delta\theta)^2}\right] < 0. \tag{28}$$

Higher quality full news will unambiguously decrease P's demand as some consumers will substitute away from P and singlehome on M instead.

□ **Snippets.** Holding θ_H and s fixed, we partially differentiate N_P^{sq} with respect to θ_L:

$$\frac{\partial N_P^{sq}}{\partial \theta_L} = \frac{1}{2}\alpha\left(\frac{s}{\Delta\theta}\right)^2 + \frac{(1-\alpha)}{2} > 0. \tag{29}$$

Higher quality snippets will unambiguously increase P's demand by increasing the consumers' utility from using P. These two effects create an ambiguous impact on M's investment incentives.

Intuitively, higher quality full news decreases P's demand and hence also their incremental profit from news sharing. Given that M receives β of this incremental profit, the marginal revenue of investing in full news decreases relative to the status quo as the bargaining payment that M receives will decrease. Investing in snippets has the opposite effect, where higher quality snippets increases P's demand and incremental profit from news sharing, thereby increasing the bargaining payment that M receives. Therefore, the positive effects of the snippet investment must be sufficiently large to offset the negative effects of

in full news quality by ϵ may be a moderate improvement in full news quality, but because snippets are much lower quality than full news, increasing the snippet quality by $\lambda \geq \epsilon$ would be unreasonably large.

the full news investment to increase M's joint investment incentives.

Using a numerical example, we graph the condition (26) in a $\epsilon - \lambda$ coordinate in Figure 4 by setting $s = 0.2$, $\alpha = 0.5$, $\theta_H = 0.5$, and $\theta_L = 0.1$.

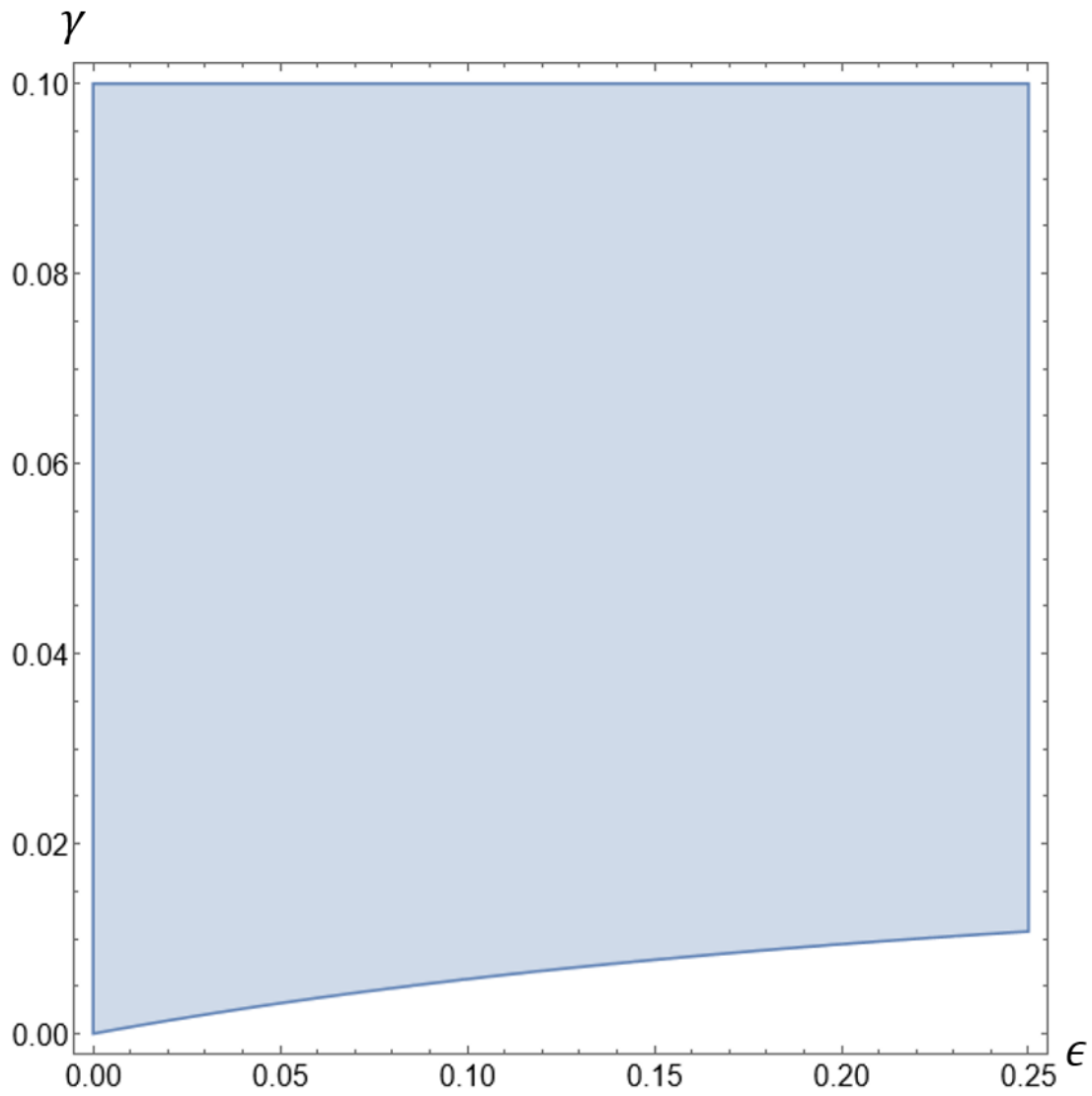

Figure 4: Joint quality investments and investment incentives under the bargaining code

We find that M's joint investment incentives are likely to increase under the bargaining code as the relative improvement in snippet quality does not need to be significant to offset the negative effects of the full news quality. Under the parameter values specified, if $\epsilon \approx 0.25$, which represents a 50% increase in full news quality, M's investment incentive will increase

for $\lambda > 0.01$, which represents just a 10% increase in snippet quality.

If $\lambda = 0$, where there is no improvement in the snippet quality, the condition in (26) simplifies to

$$\frac{1}{2}\alpha s^2 \left[\frac{\theta_L}{(\theta_H + \epsilon)(\theta_H + \epsilon - \theta_L)} - \frac{\theta_L}{\theta_H(\theta_H - \theta_L)}\right] > 0,$$

which is impossible because the LHS is negative for all $\epsilon > 0$. This implies that news publishers who invest in full news without improving their snippet quality will have a strictly lower investment incentive under the bargaining code.

Our results suggest that the investment incentives of news publishers under the bargaining code largely depends on the investment technologies they utilise and the extent to which this investment affects the quality of their snippets relative to their full news.

5 Policy Implications

5.1 Google News Showcase

Throughout our paper, we have discussed the impacts of the bargaining code on the sustainability and quality of journalism. Although the bargaining code was successfully legislated, it is not currently being used by the Australian Government. The conflict between Facebook, Google, and the Government has resulted in amendments being made to the bargaining code where Facebook and Google can avoid designation by pursuing commercial agreements with the news publishers instead. It is important to consider whether such an arrangement would yield better outcomes than under the bargaining code, particularly as Facebook and Google can negotiate without the threat of final-offer arbitration. We focus on Google. While we do not explicitly model the commercial arrangement, we provide further background on the arrangement and discuss its potential impacts in the context of our model.

Google News Showcase (hereby 'Showcase') is a news licensing program that aggregates high quality news content from participating news publishers who receives a fixed monthly payment from Google for the curation of news content. In some cases, Google will pay news

publishers for its readers to access subscription only articles. These payments are in addition to any advertising or subscription revenues generated by Showcase's readers.

□ **Sustainability of Journalism.** Although these payments are not disclosed, News Corp has stated that their agreement with Google involves 'significant payments'.[13] Clearly, these payments will contribute to the sustainability of journalism, but it is unclear whether payments under the bargaining code would be larger. Through the threat of final-offer arbitration, the bargaining code can be interpreted as equalising the bargaining powers between the platforms and news publishers. Given the commercial nature of Showcase and the absence of an enforced bargaining code, it is reasonable to expect that a bargaining power imbalance exists which would yield more favourable outcomes for Google compared to under the bargaining code. However, the mere threat of being *designated* under the bargaining code if commercial agreements are unsuccessful should encourage a more fair and reasonable negotiation.

□ **Quality of Journalism.** Google describes the content on Showcase as 'story panels' which we interpret to be high quality snippets. Moreover, we interpret the monthly curation payments as Google directly incentivising the investment in snippet quality.

After the investment in snippets is made, the investment decision of the news publisher becomes whether to invest in full news.[14] Higher quality snippets create greater awareness of the news publisher. Because there are more aware consumers, the investment will convert more consumers into subscribing compared to if the snippet investment was not made.[15] By incentivising snippet investment, we find that Showcase unambiguously increases full news investment. In contrast, the bargaining code is ambiguous and increases full news investment, through a joint investment, if and only if (27) holds. The bargaining code

[13]News Corp's statement on their partnership with Google can be found here: `https://newscorp.com/2021/02/17/news-corp-and-google-agree-to-global-partnership-on-news/`

[14]Previously, we focused on the joint investment as snippets are normally automated based on the full news. In the context of Showcase, news publishers are able to separately invest in their full news and snippets because the snippets are curated specifically for Showcase.

[15]Proof can be found in the Appendix.

otherwise disincentivises investments in full news quality.

In summary, Showcase appears to be a promising alternative as it improves both the sustainability and quality of journalism. Compared to the bargaining code, we expect that Showcase will lead to lower payments to news publishers due to their lower bargaining power, but higher incentives to invest in news quality.

5.2 News Media Bargaining Code

Is the bargaining code effective in achieving the objectives of the Australian Government? In this section, we summarise our results on the impacts of the bargaining code. First, we consider whether the bargaining code supports the sustainability of journalism through its effect on M's profit. Second, we consider whether the bargaining code incentivises M's investment in news quality through its effect on the marginal revenue of quality investment.

□ **Sustainability of Journalism.** The bargaining code was modelled through a simple revenue sharing agreement where P must pay β of their incremental profit from news sharing to M. It is unsurprising that such a payment leaves M strictly better off than under the status quo. We conclude that the bargaining code supports the sustainability of journalism by unambiguously increasing the news publishers' profits.

□ **Quality of Journalism.** Throughout our analysis, we have focused on the simple case where M makes a binary decision as to whether to invest in their news quality or not. M's investment increases θ_H by ϵ, and θ_L by λ, whether directly or incidental. From (22), we showed that the joint investment incentives under the bargaining code depends on whether the relative investment in snippets are sufficiently larger than the relative investment in full news. Our findings suggest that news publishers who predominantly focus on the quality of their full news without consideration of their snippet quality are likely to have lower incentives to invest in quality. In contrast, those who enhance their snippets alongside the quality of their full news are expected to have greater incentives to invest.

However, news publishers who invest directly in full news may still incidentally improve

the quality of snippets. The investment in full news may naturally extend to higher quality snippets, such as the snippet thumbnail adopting the improved image, or the higher quality writing extending to the snippet text. This is particularly true with Facebook and Google where the snippets are automatically updated using the meta-data of the full article. Provided that this incidental increase in snippet quality is sufficiently large, a news publisher who focuses solely on full news may still have greater incentives to invest. Moreover, we found that the relative investment in snippets do not need to be significant compared to the relative investment in full news. We conclude that the bargaining code will incentivise any quality investment that improves the quality of snippets by a relatively small amount.

5.3 Further Remarks

Our results for the bargaining code are reasonably positive and suggests that it is likely to achieve the objectives of the Australian Government. However, we have ignored the significant controversy generated by the bargaining code. We find that the commercial agreements made by Facebook and Google are promising alternatives to the bargaining code. It achieves the objectives of the Australian Government without requiring direct intervention or regulation, and is more politically feasible given the absence of the bargaining code's controversial features.

Although this might suggest that the bargaining code is no longer useful, it is evident that the threat of the bargaining code is what induced Facebook and Google to make these commercial agreements. Moreover, the threat of being designated under the bargaining code incentivises Facebook and Google to negotiate their commercial agreements more reasonably despite their dominant bargaining power. We conclude that the commercial agreements is a good outcome to the dispute between platforms, news publishers, and the Government, and that the bargaining code will remain useful as an indirect threat to the platforms.

6 Extensions

6.1 Business Models

In our analysis thus far, M is supported by both advertising and subscription revenue. We refer to news publishers who charge a subscription fee as 'subscription-based news publishers'.[16] However, many news publishers rely solely on ads. Given the difficulties that news publishers have faced in adapting their business model to digital journalism, we investigate whether our results differ when analysing a purely advertising-financed news publisher by setting $s = 0$.[17] We obtain the following result:

Proposition 6. *For a given quality level, θ_H and θ_L, an advertising-financed news publisher is more likely to benefit from news sharing and have greater investment incentives under the bargaining code, compared to a subscription-based news publisher.*

Focusing on how news sharing affects M's demand, if $s = 0$, (8) in Lemma 1 will always hold. Consumers incur no costs in reading full news. All informed consumers will subscribe to M irrespective of their valuation of news quality. There are no longer any value-appropriating effects while the information-creating effect strengthens. An increase in snippet quality increases P's demand and the number of aware consumers, who will all read full news as $s = 0$.

Moreover, the second part of Lemma 1 no longer holds. $\frac{\partial N_M^{sq}}{\partial \theta_H}$ simplifies to 0 which implies that an increase in θ_H no longer affects M's demand. Investing in θ_H becomes redundant when all consumers will read full news regardless, as $\theta_H > \theta_L$. P's demand will no longer be affected by θ_H and is lower than under the status quo in our base model in (4). Intuitively, charging a subscription fee $s > 0$ incentivises consumers to substitute between full news from

[16] We include news publishers who have a mixed business model (advertising and subscription revenues) under this title as the advertising revenue does not impact our results.

[17] Because quality is exogenous, an implicit assumption is that the quality of full news and snippets are the same across the advertising and mixed business models. If quality was endogenous, we would expect that the optimal θ_H and θ_L would differ between business models. However, this assumption effectively allows us to hold quality constant and focus on how the business model, or subscription fee, affects our results.

M and snippets on P.

We now consider how an advertising-financed business model affects M's joint investment incentives under the bargaining code. When $s = 0$, (26) simplifies to

$$\frac{(1-\alpha)}{2}\lambda > 0,$$

which automatically holds if $\lambda > 0$. Because θ_H no longer affects P's demand, a full news investment no longer hurts P. A joint investment will only have a positive effect on P's incremental profit through the higher snippet quality. M is then entitled to a fraction β of this increase, implying that their incentives to invest in quality is strictly greater under the bargaining code.

We infer that the business model of the news publisher is important in determining how they are impacted by news sharing and the bargaining code. Our model implies that advertising-financed news publishers unambiguously benefit from news sharing, but there is an ambiguous impact on subscription-based news publishers. Empirically, very few consumers are willing to pay for online news, primarily due to the proliferation of free alternatives (Chyi, 2005). Consumers are likely to substitute away from paid news if free, advertising supported, alternatives become available. Moreover, we find that the bargaining code strictly increases the investment incentives of advertising-financed news publishers, but has an ambiguous impact on subscription-based news publishers due to the negative effect that a full news investment has on the platform.

However, these results should be interpreted with caution. The assumption that $s = 0$ is an extreme case where consumers incur no costs, both monetary and non-monetary costs, thus all aware consumers will read full news. In reality, consumers do incur costs in reading full news or switching between the platform and the news publisher's website. We can split the total cost of reading full news, c_F, into the subscription fee and a constant reading and/or switching cost, γ_M,

$$c_F = s + \gamma_M,$$

which would replace s in our model. If we set $s = 0$, consumers still incur a reading cost under an advertising-financed news publisher. From the consumers' perspective, this is equivalent to setting a subscription fee with no reading costs. Therefore, adding a reading cost would reintroduce the value-appropriating effects, the negative effect of full news on M, and the ambiguity in our results. However, our main result that the business model is important continues to hold. Charging a subscription fee creates additional costs of reading full news such that subscription-based news publishers are more negatively impacted by news sharing and their investment incentives are less likely to increase under the bargaining code.

6.2 Endogenous Content Providers

In our base model, content providers are exogenous. We extend our base model by endogenizing the number of content providers and the utility they provide to consumers using a simple framework. Assume that the total revenue generated among all content providers on the platform is given by

$$R_{\text{cp}} = \frac{aN_P}{x_{\text{cp}}}, \tag{30}$$

where x_{cp} is the number of content providers on the platform. We assume that content providers have heterogenous entry costs of c_{cp} that is uniformly distributed on $[0, \omega]$. Therefore, CPs will enter if and only if

$$\frac{aN_P}{x_{\text{cp}}} \geq c_{\text{cp}}. \tag{31}$$

Furthermore, assume that the utility that CPs provide to platform users, v_{cp}, is a linear function of x_{cp}, which takes the form of

$$v_{\text{cp}} = \phi x_{\text{cp}}, \tag{32}$$

where ϕ is an exogenous parameter for the utility that consumers derive per CP. Applying these assumptions, we solve for x_{cp} under each of the policy regimes but leave the proof in

the Appendix. The equilibrium number of x_{cp} in the status quo is given by

$$x_{\text{cp}}^{sq} = \frac{a\phi}{2\omega} + \frac{1}{2\omega}\sqrt{a^2\phi^2 + 4a\omega\left[v_0 + \frac{1}{2}\alpha\left(\frac{s}{\Delta\theta}\right)\left(\frac{\theta_L s}{\theta_H}\right) + (1-\alpha)\frac{\theta_L}{2}\right]}. \tag{33}$$

Because CPs rely on P as their sole source of readership, the comparative statics of x_{cp}^{sq} will have the same sign as N_P^{sq} for all variables. Applying our findings from Proposition 5, we obtain the following result.

Proposition 7. *The equilibrium number of content providers that can operate sustainably on P increases from M's investment in snippets and decreases from M's investment in full news. A joint quality investment by M will increase the equilibrium number of content providers if and only if the relative investment in snippets is sufficiently large.*

We find that a full news investment now harms P through two channels: a direct and indirect effect. First, higher quality full news has a direct effect on P by causing some consumers to substitute from P to M. The decrease in N_P reduces the ad revenues generated by CPs, which results in fewer CPs that can sustainably publish content on P. Second, an indirect effect arises where the decrease in x_{cp} leads to lower v_{cp}, which further decreases N_P. A feedback loop occurs where a decrease in N_P leads to fewer x_{cp} and lower v_{cp}, which further lowers N_P, x_{cp}, and v_{cp}.

Similarly, a snippet investment has a direct effect on P by increasing their demand as the utility of using P increases. The total ad revenue generated among the CPs increase, providing opportunities for CPs with higher costs to sustainably operate on P. An indirect effect arises through the subsequent increase in v_{cp}, N_P, and then also x_{cp}, which creates a feedback loop. Evidently, the presence of CPs amplifies the effects of M's quality investment on P compared to in our base model.

The presence of CPs also amplifies the effects of M's quality investment on itself. Relative to our base model, a full news investment will reduce P's demand that is amplified by the decrease in x_{cp} and v_{cp}. This encourages more consumers to singlehome on M instead of P. Moreover, both the value-appropriating effects and information-creating effect strengthens.

The additional utility of using P will create more aware consumers who will subscribe to M. However, it will also cause more consumers to singlehome on P instead of M. Because CPs merely amplify the effects identified in our base model, our main results continue to hold.

Under the news ban regime, CPs can no longer operate on P, which implies that $x_{\text{cp}} = 0$ and $v_{\text{cp}} = 0$. x_{cp}^{sq} of CPs are worse-off as they lose their only viable distribution method and their positive profits. This creates a welfare loss of v_{cp}^{sq} per platform user, in addition to the loss of $t\theta_L$ from snippets, which also reduces P's demand.

Finally, the bargaining code explicitly excludes any news publisher with revenues of less than \$150,000.[18] Because the CPs are small, they may not generate sufficient revenues to be covered under the bargaining code. In this case, CPs will not receive a bargaining payment and x_{cp} will be the same as under the status quo. However, CPs will still be indirectly impacted by how the bargaining code affects M's investment incentives. If the conditions under Proposition 5 and Proposition 7 holds, M will be more likely to invest in quality such that the equilibrium number of CPs also increase. If we assume that the CPs satisfy the revenue test and are entitled to a bargaining payment from P, unsurprisingly, the equilibrium number of CPs under the bargaining code is strictly greater than under the status quo.[19]

6.3 Revenue Sharing and M's Incremental Profit

In this section, we consider how factoring in the benefit that M has received from news sharing into the revenue sharing agreement affects our results. If M has benefited from news sharing such that $\pi_M^{sq} > \pi_M^{nb}$, the bargaining payment made by P will be offset by a share β of M's incremental profit. If M was harmed by news sharing such that $\pi_M^{sq} < \pi_M^{nb}$, M will be entitled to an additional 'compensation payment' equal to β of their incremental loss. Because M cannot be worse-off from the bargaining code, we restrict the payment to be non-negative. The constraint will bind in the case that M derives more benefit from news

[18] See section '52M Revenue test' of the final legislation: `https://www.legislation.gov.au/Details/C2021A00021`

[19] The proof can be found in the Appendix.

sharing than P. We denote $\Delta\pi_M \equiv \pi_M^{sq} - \pi_M^{nb}$. Under these assumptions, M's profit under the bargaining code is given by

$$\pi_M^{bc} = \begin{cases} \pi_M^{sq} + \beta\left[\Delta\pi_P - \Delta\pi_M\right] & \text{if } \Delta\pi_M < \Delta\pi_P \\ \pi_M^{sq} & \text{if } \Delta\pi_M \geq \Delta\pi_P. \end{cases} \tag{34}$$

The only difference from (20) is the inclusion of M's incremental profit from news sharing. In the case that M is harmed by news sharing, M receives a compensation payment which increases as the value-appropriating effects become larger. Effectively, the revenue sharing agreement is partially tied to how badly M is affected by news sharing, with the most adversely impacted news publishers benefiting the most.

	$\Delta\pi_P$	Payment	$\Delta\pi_M$	Payment	Total Effect on Payment
$\theta_H \uparrow$	$\downarrow$	$\downarrow$	$\uparrow$	$\downarrow$	$\downarrow$
$\theta_L \uparrow$	$\uparrow$	$\uparrow$	$\uparrow\downarrow$	$\uparrow\downarrow$	$\uparrow\downarrow$

Table 2: Revenue sharing agreement under the bargaining code

Table 2 identifies how an investment in full news and snippets affects both P and M's incremental profit and the bargaining payment. Given these effects, we derive the following result.

Proposition 8. *If the bargaining code incorporates M's incremental profit and a compensation payment, the total bargaining payment and the news publisher's investment incentives are increasing in the value-appropriating effects.*

M's investment in quality now affects their own incremental profit, which creates further ambiguity in the impacts of the bargaining code. An investment in θ_H increases demand and softens the impact of news sharing on M. Under the bargaining code, β of this increase in incremental profit will be offset against P's payment, which decreases the marginal revenue of investing in full news. Combined with its impact on P's incremental profit, the bargaining code has a strictly negative effect on full news investment.

If the information-creating effect dominates the value-appropriating effects, an investment in θ_L increases the benefit that M receives from news sharing, which will be offset against P's bargaining payment. Interestingly, M's investment incentives increases with the value-appropriating effects. When the value-appropriating effects are strong, higher quality snippets will harm M such that they are more adversely impacted by news sharing. M is entitled to a larger compensation payment, which raises the marginal revenue of quality investment. When the bargaining code incorporates the impact of news sharing on M, we find that it is more likely to raise the investment incentives of news publishers who are worse-off from news-sharing.

Our results have significant implications on the policy design of the bargaining code. In the base model, the bargaining code ensured that M was strictly better off, but only increased their investment incentives when the relative investment in θ_L was sufficiently large. When we incorporate M's incremental profit from news sharing and allow for a compensation payment, there are two desirable effects. First, the worse-off a news publisher is from news sharing, the greater the compensation payments they receive, thereby supporting the sustainability of those impacted by news sharing the most. Second, the investment incentives are greater for those who are impacted by news sharing the most. This comes at the cost of reducing the investment incentives of those who benefit substantially from news sharing by reducing the bargaining payment they receive. However, we can modify the bargaining code to include only compensation payments and remove the requirement that any benefit received must be offset against the bargaining payment. In this setup, the compensation payments will increase the incentives of those who are harmed by news sharing.

These theoretical results are consistent with the objectives of the bargaining code and yield better outcomes for news publishers compared to our base model. However, such a policy would likely face further resistance by the platforms and in practice, it would be difficult to estimate the impact of news sharing on each news publisher. Regardless, our results pose interesting theoretical implications for the impacts of 'compensation payments'.

7 Conclusion

Digital platforms have dominated the market for consumer attention and digital advertising. Their success is partially attributable to the third party content that they host on the platform, including news content. With the sustainability of quality journalism in question, attention has turned to the dominance of these platforms, the significant bargaining imbalances between the platforms and news publishers, and their 'appropriation' of the news publishers' content. To address these issues, the 'News Media Bargaining Code' was developed and legislated in Australia to force dominant platforms to pay news publishers for their links and snippets.

In this paper, we have developed a simple model to analyse the impacts of the bargaining code on the sustainability and quality of journalism. By partially tying the profits of the news publisher to the incremental profits of the platform from news sharing, the bargaining code strictly increases the news publisher's profit and incentivises any quality investment that increases the demand of the platform. Specifically, we show that the bargaining code increases the incentives to make a joint investment in quality if the relative investment in snippets is sufficiently large to offset the negative effects of a full news investment on the platform. We also show that a news ban has an ambiguous impact on both the sustainability and quality of journalism. News publishers are better-off under a news ban if the value-appropriating effects dominate the information-creating effect, and have greater incentives to invest in the quality of their news if the value-appropriating effects on investment dominates the information-creating effects on investment. Focusing on the recent commercial agreements made in place of the bargaining code, we find that Google News Showcase supports the sustainability of journalism through the monthly payments made to news publishers for curating high quality snippets for the platform. In doing so, Google incentivises the snippet investment of the news publisher, which increases the incentives to invest in full news through the larger number of aware consumers.

There are significant policy implications from our findings. The bargaining code does not

strictly increase the incentives to invest in news quality. In fact, we find that it disincentivises full news investments (but may still increase full news quality by incentivising a joint investment). Policy makers who aim to support the quality of journalism may thus seek alternative policies. Combined with its controversy and political challenges, we establish that commercial agreements may be more desirable than negotiations under the bargaining code. However, the bargaining code acts as an indirect threat and ensures that the platforms negotiate their commercial agreements fairly.

To maintain the tractability of our model, most of the variables are exogenous. Future research should allow the optimal subscription fee and quality of both snippets and full news to be endogenously determined by the news publisher to improve the flexibility of the model. Our justification for an exogenous subscription fee relied on the assumption of competition between two homogeneous news publishers. Extending the model to incorporate competition between heterogeneous news publishers would better capture the reality of the journalism industry and the variety of content that consumers can read.

Moreover, we modelled the platform as passively hosting content. In practice, platforms actively choose the content they wish to display to consumers, particularly through the use of algorithms. Because the algorithms implemented by the platform can significantly alter what the consumer views and the traffic driven to a news publisher, the bargaining code specifically requires that the platform provide notice of any algorithm changes in advance to allow the news publishers to adapt to the new algorithm. Future research could allow the platform to endogenously determine the optimal quantity of snippets to display to its users. Research could also be conducted on the requirement to give advance notice of any algorithm changes and its potential impacts.

Overall, we see our paper as a first step in uncovering the impacts of the bargaining code and as a foundation for future research. These extensions may shed light on other effects and implications of the bargaining code that our model is unable to capture.

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Appendix A Omitted Proofs

Proof of Lemma 1. Holding θ_H and s fixed, partially differentiate $N_M^{sq}(v, \theta_L, \theta_H)$ with respect to θ_L,

$$\frac{\partial N_M^{sq}(v, \theta_L, \theta_H)}{\partial \theta_L} = \frac{-2vs(\theta_H)^2 - \alpha s^2 \theta_L(2\theta_H - \theta_L) + (1-\alpha)(\theta_H)^2[(\theta_H - \theta_L)^2 - s\theta_H]}{2(\theta_H)^2(\theta_H - \theta_L)^2}.$$

Since the denominator is strictly positive, the condition in (8) follows. By partially differentiating $N_M^{sq}(v, \theta_L, \theta_H)$ with respect to θ_H,

$$\frac{\partial N_M^{sq}(v, \theta_L, \theta_H)}{\partial \theta_H} = \frac{s\begin{pmatrix}\alpha\theta_H(\theta_L)^2 s + 2\alpha\theta_H(\theta_H - \theta_L)^2(\overline{\gamma} - v) \\ + 2\alpha(\theta_L)^2 s(\theta_H - \theta_L) + (\theta_H)^3(2v + (1-\alpha)\theta_L)\end{pmatrix}}{2(\theta_H)^3(\theta_H - \theta_L)^2} > 0,$$

the second part of Lemma 1 holds. ■

Proof of Proposition 4. The news ban incentivises M to invest if and only if

$$N_M^{nb}(v_0, \theta_H + \epsilon) - N_M^{nb}(v_0, \theta_H) \geq N_M^{sq}(v, \theta_L + \lambda, \theta_H + \epsilon) - N_M^{sq}(v, \theta_L, \theta_H). \tag{A.1}$$

From (18), the LHS can be written as

$$\alpha\overline{\gamma}\left(\frac{s}{\theta_H} - \frac{s}{\theta_H + \epsilon}\right),$$

and from (10), the RHS can be written as

$$\begin{aligned}&\alpha\overline{\gamma}\left(\frac{s}{\theta_H} - \frac{s}{\theta_H + \epsilon}\right) - \alpha v\left(\frac{s}{\theta_H} - \frac{s}{\theta_H + \epsilon}\right) + \frac{(1-\alpha)}{2}\lambda + v\left(\frac{s}{\Delta\theta} - \frac{s}{\Delta\theta + \epsilon - \lambda}\right) \\ &+ \frac{(1-\alpha)}{2}\left[\frac{s\theta_L}{\Delta\theta} - \frac{s(\theta_L + \lambda)}{\Delta\theta + \epsilon - \lambda}\right] + \frac{\alpha s^2}{2}\left[\frac{(\theta_L)^2}{\Delta\theta(\theta_H)^2} - \frac{(\theta_L + \lambda)^2}{(\Delta\theta + \epsilon - \lambda)(\theta_H + \epsilon)^2}\right]\end{aligned}$$

We can then rewrite condition (A.1) as

$$\begin{aligned}&- \alpha v\left(\frac{s}{\theta_H} - \frac{s}{\theta_H + \epsilon}\right) + \frac{(1-\alpha)}{2}\lambda + v\left(\frac{s}{\Delta\theta} - \frac{s}{\Delta\theta + \epsilon - \lambda}\right) \\ &+ \frac{(1-\alpha)s}{2}\left[\frac{\theta_L}{\Delta\theta} - \frac{(\theta_L + \lambda)}{\Delta\theta + \epsilon - \lambda}\right] + \frac{\alpha s^2}{2}\left[\frac{(\theta_L)^2}{\Delta\theta(\theta_H)^2} - \frac{(\theta_L + \lambda)^2}{(\Delta\theta + \epsilon - \lambda)(\theta_H + \epsilon)^2}\right] \leq 0.\end{aligned} \tag{A.2}$$

The LHS must be negative. The total of the first three terms are strictly positive, as

$\frac{(1-\alpha)}{2}\lambda > 0$, and $v\left(\frac{s}{\Delta\theta} - \frac{s}{\Delta\theta+\epsilon-\lambda}\right) > -\alpha v\left(\frac{s}{\theta_H} - \frac{s}{\theta_H+\epsilon}\right)$. The fourth term is ambiguous but is negative if the relative investment in snippets, λ, is sufficiently larger than the relative investment in full news, ϵ. The fifth term is also ambiguous and requires an even larger relative investment in snippets to be negative, but is a very small value due to the s^2. Therefore, λ must be extremely large for the fourth and fifth term to be sufficiently negative to offset the first three terms that are positive, including the second term which directly increases with λ.

Proof of equilibrium content providers.

□ **Status Quo.** From (31), applying the uniform distribution of c_{cp} gives us

$$x_{\text{cp}} = \frac{aN_P}{\omega x_{\text{cp}}}. \tag{A.3}$$

Combining (32), (A.3) and P's demand in the status quo given by (4) results in

$$\omega\left(x_{\text{cp}}^{sq}\right)^2 = a\left[v_0 + \phi x_{\text{cp}} + \frac{1}{2}\alpha\left(\frac{s}{\Delta\theta}\right)\left(\frac{\theta_L s}{\theta_H}\right) + (1-\alpha)\frac{\theta_L}{2}\right],$$

which we can rearrange to give us the following quadratic expression

$$\omega\left(x_{\text{cp}}^{sq}\right)^2 - a\phi x_{\text{cp}}^{sq} - a\left[v_0 + \frac{1}{2}\alpha\left(\frac{s}{\Delta\theta}\right)\left(\frac{\theta_L s}{\theta_H}\right) + (1-\alpha)\frac{\theta_L}{2}\right] = 0.$$

Solving the above, the equilibrium number of x_{cp} in the status quo is given by

$$x_{\text{cp}}^{sq} = \frac{a\phi}{2\omega} + \frac{1}{2\omega}\sqrt{a^2\phi^2 + 4a\omega\left[v_0 + \frac{1}{2}\alpha\left(\frac{s}{\Delta\theta}\right)\left(\frac{\theta_L s}{\theta_H}\right) + (1-\alpha)\frac{\theta_L}{2}\right]}.$$

□ **News Media Bargaining Code.** Assume that P makes a payment to the CPs based on the incremental profit generated from the additional v_{cp} in utility. The presence of CPs increases the utility of using P by $v_{\text{cp}} = \phi x_{\text{cp}}$, which increases P's demand by the same amount. Therefore, P's incremental profit from CPs is simply $\Delta\pi_P^{\text{cp}} = av_{\text{cp}} = a\phi x_{\text{cp}}$, which we assume that CPs receive a share of ξ. Under the new assumptions, total revenues

generated among all CPs is now equal to

$$R_{\text{cp}}^{bc} = \frac{aN_P + \xi a\phi x_{\text{cp}}}{x_{\text{cp}}},$$

which we use the uniform distribution of c_{cp} to obtain the following quadratic equation

$$\omega \left(x_{\text{cp}}^{bc}\right)^2 - a\phi(1+\xi)x_{\text{cp}}^{sq} - a\left[v_0 + \frac{1}{2}\alpha\left(\frac{s}{\Delta\theta}\right)\left(\frac{\theta_L s}{\theta_H}\right) + (1-\alpha)\frac{\theta_L}{2}\right].$$

Solving the above gives us the equilibrium x_{cp} of

$$x_{\text{cp}}^{bc} = \frac{a\phi(1+\xi)}{2\omega} + \frac{1}{2\omega}\sqrt{a^2\phi^2(1+\xi)^2 + 4a\omega\left[v_0 + \frac{1}{2}\alpha\left(\frac{s}{\Delta\theta}\right)\left(\frac{\theta_L s}{\theta_H}\right) + (1-\alpha)\frac{\theta_L}{2}\right]}.$$

Unsurprisingly, the equilibrium number of CPs under the bargaining code is strictly greater than (33) under the status quo.

Proof of Proposition 7.

□ **Full News.** Taking the partial derivative of (33) with respect to θ_H, holding all other parameters constant.

$$\frac{\partial x_{\text{cp}}^{sq}}{\partial \theta_H} = -\frac{2a\omega\alpha\theta_L s^2\left(\theta_H + \Delta\theta\right)}{\left[\theta_H(\Delta\theta)\right]^2} < 0.$$

An investment in θ_H unambiguously reduces the number of CPs that operate on P. We show that a full news investment affects M directly and indirectly. Taking the partial derivative of P's demand with respect to θ_H, after incorporating the equilibrium x_{cp}^{sq}, gives us

$$\frac{\partial N_P^{sq}}{\partial \theta_H} = \underbrace{-\frac{2\phi a\omega\alpha\theta_L s^2\left(\theta_H + \Delta\theta\right)}{\left[\theta_H(\Delta\theta)\right]^2}}_{\text{Indirect effect via CPs}} \underbrace{-\frac{1}{2}\alpha\theta_L s^2\left[\frac{2\theta_H - \theta_L}{\theta_H^2(\Delta\theta)^2}\right]}_{\text{Direct effect on } M}.$$

□ **Snippets.** Similarly, to consider how an investment in θ_L impacts x_{cp}, we take the partial derivative of x_{cp} with respect to θ_L, which gives

$$\frac{\partial x_{\text{cp}}^{sq}}{\partial \theta_L} = \frac{a\left[\frac{\alpha s^2}{(\Delta\theta)^2} + (1-\alpha)\right]}{2\sqrt{a^2\phi^2 + 4a\omega\left[v_0 + \frac{1}{2}\alpha\left(\frac{s}{\Delta\theta}\right)\left(\frac{\theta_L s}{\theta_H}\right) + (1-\alpha)\frac{\theta_L}{2}\right]}} > 0.$$

We show that there are also direct and indirect effects associated with θ_L.

$$\frac{\partial N_P^{sq}}{\partial \theta_L} = \underbrace{\frac{a\left[\frac{\alpha s^2}{(\Delta\theta)^2} + (1-\alpha)\right]}{2\sqrt{a^2\phi^2 + 4a\omega\left[v_0 + \frac{1}{2}\alpha\left(\frac{s}{\Delta\theta}\right)\left(\frac{\theta_L s}{\theta_H}\right) + (1-\alpha)\frac{\theta_L}{2}\right]}}}_{\text{Indirect effect via CPs}} + \underbrace{\frac{1}{2}\alpha\left(\frac{s}{\Delta\theta}\right)^2 + \frac{(1-\alpha)}{2}}_{\text{Direct effect on } M}.$$

Proof of full news investment under Google News Showcase.

Under the status quo, the marginal revenue of full news investment **without** a snippet investment is given by

$$\begin{aligned}
\Delta N_{\epsilon}^{sq} &= N_{B,\epsilon}^{sq} - N_B^{sq} \\
&= \left[v + \frac{(1-\alpha)}{2}\theta_L\right]\left(\frac{s}{\Delta\theta} - \frac{s}{\Delta\theta+\epsilon}\right) + \alpha(\overline{\gamma} - v)\left(\frac{s}{\theta_H} - \frac{s}{\theta_H+\epsilon}\right) \\
&\quad + \frac{\alpha s^2}{2}\left[\frac{\theta_L^2}{\Delta\theta(\theta_H)^2} - \frac{\theta_L^2}{(\Delta\theta+\epsilon)(\theta_H+\epsilon)^2}\right]
\end{aligned}$$

The marginal revenue of full news investment **after** a snippet investment is given by

$$\begin{aligned}
\Delta N_{\epsilon,\lambda}^{sq} &= N_{B,\epsilon,\lambda}^{sq} - N_{B,\lambda}^{sq} \\
&= \left[v + \frac{(1-\alpha)}{2}(\theta_L+\lambda)\right]\left(\frac{s}{\Delta\theta-\lambda} - \frac{s}{\Delta\theta+\epsilon-\lambda}\right) + \alpha(\overline{\gamma} - v)\left(\frac{s}{\theta_H} - \frac{s}{\theta_H+\epsilon}\right) \\
&\quad + \frac{\alpha s^2}{2}\left[\frac{(\theta_L+\lambda)^2}{(\Delta\theta-\lambda)\theta_H^2} - \frac{(\theta_L+\lambda)^2}{(\Delta\theta+\epsilon-\lambda)(\theta_H+\epsilon)^2}\right]
\end{aligned}$$

Taking the difference between the above gives us

$$\begin{aligned}
\Delta N_{\epsilon,\lambda}^{sq} - \Delta N_{\epsilon}^{sq} &= \left[v + \frac{(1-\alpha)}{2}\theta_L\right]\left[\left(\frac{s}{\Delta\theta-\lambda} - \frac{s}{\Delta\theta}\right) - \left(\frac{s}{\Delta\theta+\epsilon-\lambda} - \frac{s}{\Delta\theta+\epsilon}\right)\right] \\
&\quad + \frac{(1-\alpha)}{2}\lambda\left(\frac{s}{\Delta\theta-\lambda} - \frac{s}{\Delta\theta+\epsilon-\lambda}\right) \\
&\quad + \frac{\alpha s^2}{2}\left[\left(\frac{(\theta_L+\lambda)^2}{(\Delta\theta-\lambda)\theta_H^2} - \frac{\theta_L^2}{\Delta\theta(\theta_H)^2}\right) - \left(\frac{(\theta_L+\lambda)^2}{(\Delta\theta+\epsilon-\lambda)(\theta_H+\epsilon)^2} - \frac{\theta_L^2}{(\Delta\theta+\epsilon)(\theta_H+\epsilon)^2}\right)\right],
\end{aligned}$$

where all terms are strictly positive. Therefore, the marginal revenue of full news investment is greater **after** an investment in snippets, compared to **without** an investment in snippets. This implies that an investment in snippets incentivises the investment in full news.