

Online Appendix for Three Sided Media Markets

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1 Analytical Solutions for the Triangular Distribution Example.

The advertising level solves $F\left(\frac{u}{a}\right) = f\left(\frac{u}{a}\right) \frac{u}{a}$ or

$$1 - \frac{(\bar{\eta} - \frac{1}{a})^2}{(\bar{\eta} - \underline{\eta})^2} = \frac{2(\bar{\eta} - \frac{1}{a})}{(\bar{\eta} - \underline{\eta})^2} \frac{1}{a} \quad (1)$$

Impose the technical restriction that $\bar{\eta} - \underline{\eta} \geq \frac{1}{\underline{\eta}}$ which ensures that the a which solves the above is between 0 and 1. Then the advertising level in the ad-only model is

$$a^* = \frac{1}{\sqrt{2\bar{\eta}\underline{\eta} - \underline{\eta}^2}} \quad (2)$$

The advertising level is decreasing as both the upper and lower ends of the support of the nuisance cost increase. This is because the higher the average nuisance cost, the fewer consumers will watch at a given advertising level and the lower the ad-view maximizing a will be.

With the addition of the subscription, the advertising level goes to 1 and the subscription price solves

$$\frac{1 - F_{\eta}(\tilde{p}_s)}{f_{\eta}(\tilde{p}_s)} = \tilde{p}_s - \tilde{p}_a \quad (3)$$

which gives

$$\tilde{p}_s = \min \left[\frac{2}{3} \left(\frac{\bar{\eta}}{2} + \tilde{p}_a \right), 1 \right] \quad (4)$$

The price is increasing as consumers become more sensitive to ads since this means that for any given price fewer consumers back will use the free version, but also increases in the advertising price. The higher the advertising price, the less the platform loses from converting a subscriber back into a free viewer.

2 Additional Numerical Results

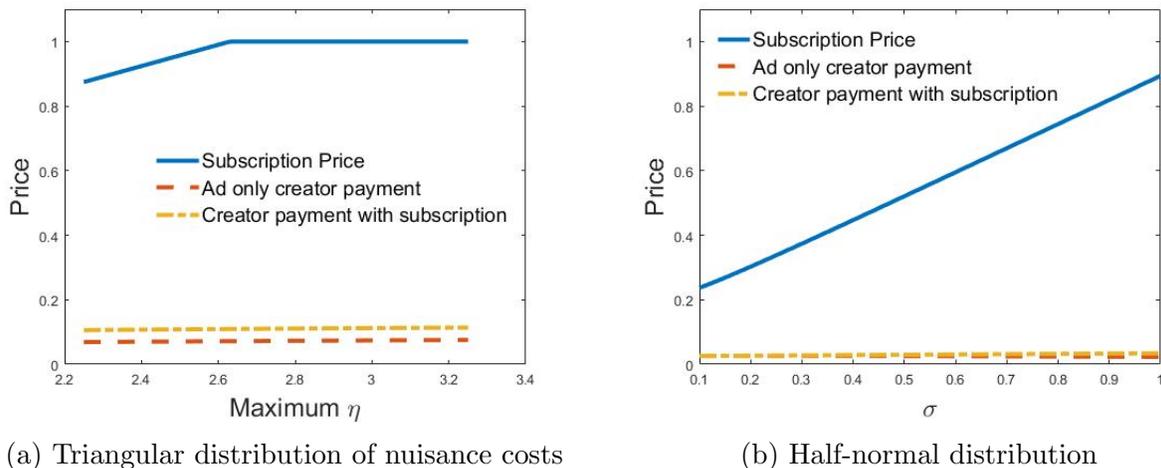


Figure 1: Variation in subscription price and creator payment by advertising sensitivity.
 Parameter values: $\underline{\eta} = 0.25, \mu = 0, z = 0.2, c = 0.05, \alpha = 3, u = 1$

Figure 1a shows the influence of $\bar{\eta}$ on the subscription price and the creator payments. While the subscription price is higher when consumers are more ad sensitive, the creator payments increase almost imperceptibly. This is because p grows quite slowly with η so the value of additional markets does not significantly increase as $\bar{\eta}$ increases. The subscription price is high, and once it reaches the corner the rate at which additional consumers are driven onto the subscription as $\bar{\eta}$ increases is low. While the subscription price in Figure 1b is lower than that in the triangular model, it follows the same general pattern of increasing in ad sensitivity while the creator payments are almost constant.

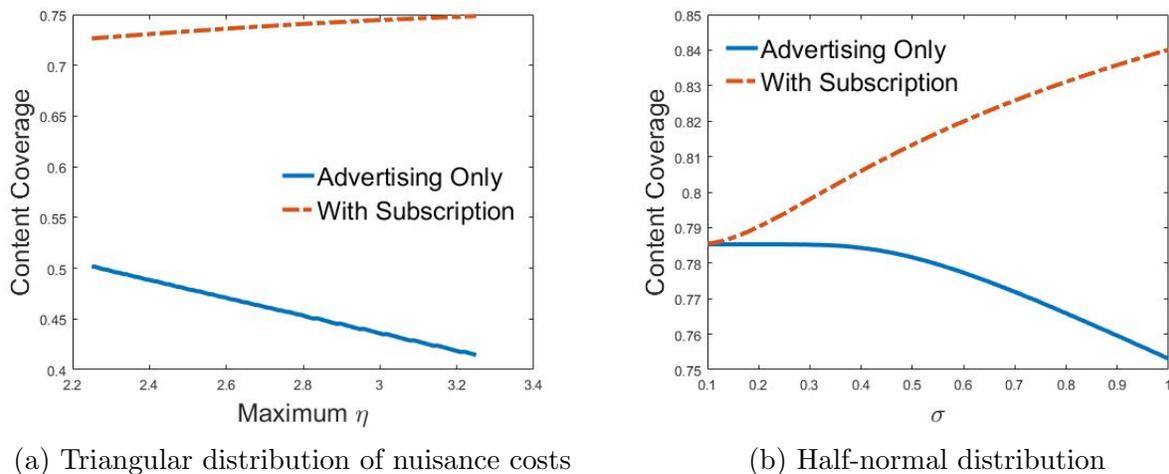


Figure 2: Variation in t^* by advertising sensitivity.
 Parameter values: $\underline{\eta} = 0.25, \mu = 0, z = 0.2, c = 0.05, \alpha = 3, u = 1$

Figure 2a shows the equilibrium content coverage under the advertising-only and subscription models. As consumers become more sensitive to ads, platform and creator profits decrease in the advertising-only model since the number of ad views will decrease, decreasing the number of creators who produce. With the addition of the subscription, increased sensitivity to advertising becomes an advantage for the platform as more consumers choose to pay the subscription fee rather than watch ads. Since w is increasing in p (albeit not by much), and more consumers choose to watch rather than staying with the outside option, the creator revenue increases as average nuisance cost increases, and this increases the amount of content produced under the subscription. Content coverage follows a similar pattern with the half-normal nuisance cost distribution, which can be seen in Figure 2b as the disadvantage the platform faces when it cannot offer the subscription once again becomes a strength when it can.

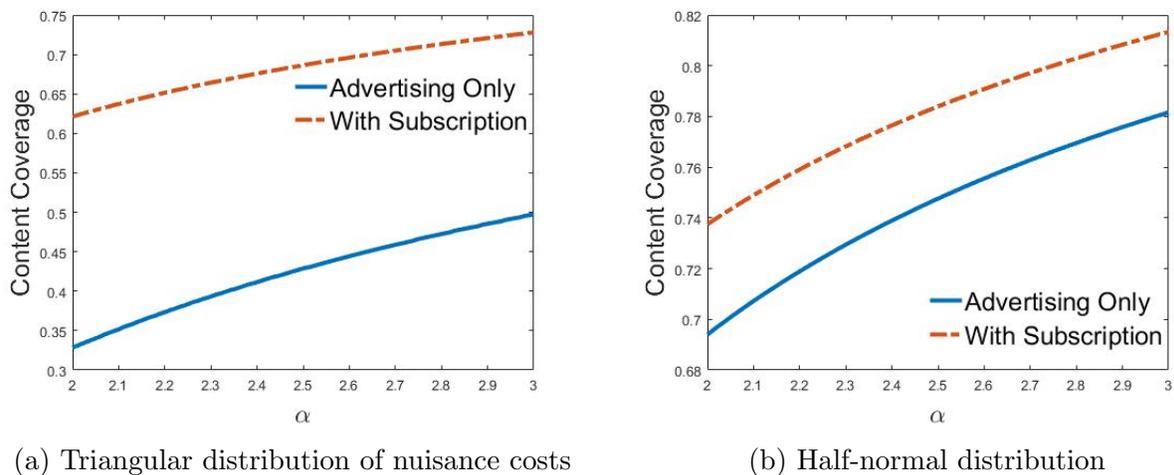
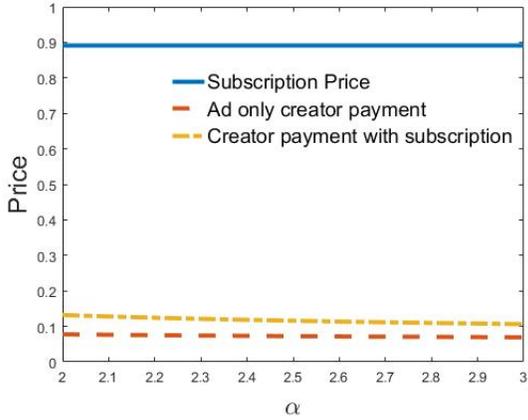


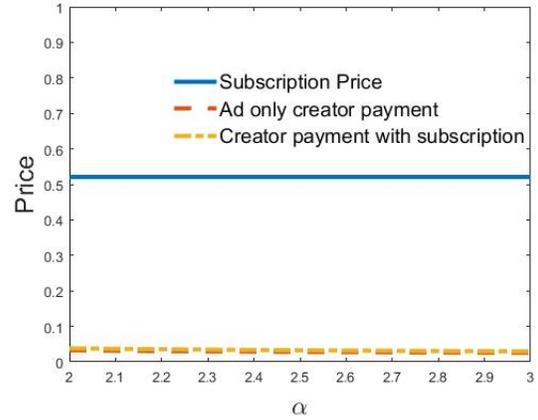
Figure 3: Variation in t^* by curvature of $g(\cdot)$.

Parameter values: $\underline{\eta} = 0.25, \mu = 0, z = 0.2, c = 0.05, \bar{\eta} = 2.3, \sigma = 0.5, u = 1$

Figure 3a shows content coverage in the two models as curvature decreases. The advertising-only coverage is more responsive to the change in curvature than coverage with the subscription. This results from the fact that the increase in creators' share of revenue as a result of the subscription is smaller as α increases (see Figure 4a). The pattern in Figure 3b is roughly similar, except that the subscription coverage level is more responsive to introduction of the subscription as α increases (albeit not visibly) when nuisance costs follow a half-normal distribution. The difference is due to the fact that the increase in creator payment as a result of the subscription is much smaller with the half normal nuisance cost distribution and therefore does not have much room to decrease as α increases, meaning that the increase in viewership has more impact on creator revenue.



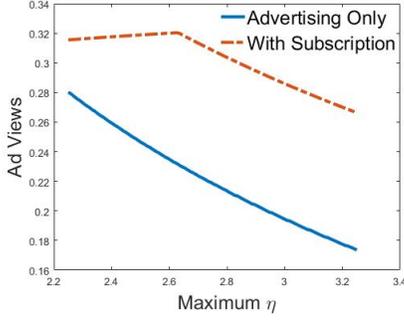
(a) Triangular distribution of nuisance costs



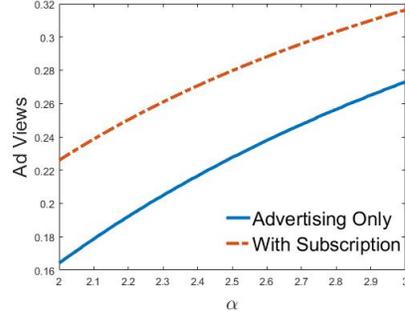
(b) Half-normal distribution

Figure 4: Variation in subscription price and creator payment by curvature of $g(\cdot)$.
 Parameter values: $\underline{\eta} = 0.25, \mu = 0, z = 0.2, c = 0.05, \bar{\eta} = 2.3, \sigma = 0.5, u = 1$

Figure 4a and Figure 4b depict qualitatively similar variation in the equilibrium prices as a function of α . The subscription price does not depend on α since subscription rates depend only on nuisance cost which is distributed independently of content type. The creator payment in the premium model *decreases* with α . Market coverage under the advertising-only model is increasing and p does not vary with α . The marginal benefit of gaining an additional content market decreases relative to the marginal cost because an increase in creator payments will involve paying more creators who are already producing, so the amount by which the platform is willing to increase the creators' share of revenue as a result of the subscription decreases.

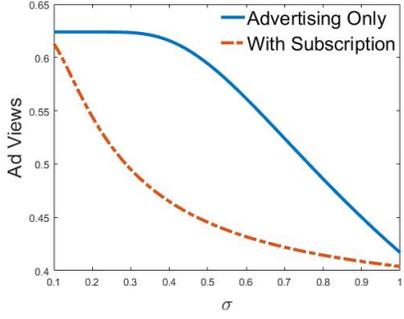


(a) Variation by advertising sensitivity.

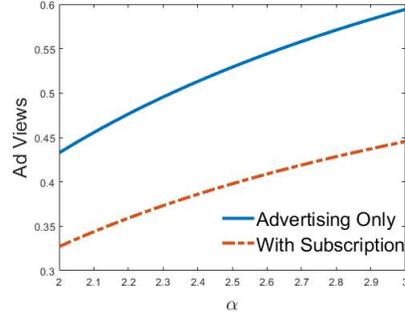


(b) Variation by curvature of $g(\cdot)$.

Triangular distribution of nuisance costs.



(c) Variation by advertising sensitivity.



(d) Variation by curvature of $g(\cdot)$.

Half normal distribution.

Figure 5: Variation in ad views.

Parameter values: $\underline{\eta} = 0.25, \mu = 0, z = 0.2, c = 0.05, u = 1$ and $\alpha = 3$ or $\bar{\eta} = 2.3, \sigma = 0.5$

Figure 5a and Figure 5b depict the total number of ad views under the two business models with the triangular distribution of nuisance costs, and Figure 5c and Figure 5d show ad views with the half normal distribution. Total ad views decrease with nuisance cost since more consumers will either not watch or subscribe, and increase as $g(\cdot)$ flattens since market coverage is increasing. However the effect of the subscription is ambiguous, with the triangular distribution the consumers who continue to watch ads are exposed to more advertising since a is moving from an interior solution to the corner at 1, which mitigates the loss from subscribing consumers in addition to the extensive market effect. With the half normal distribution the advertising level is already at the corner so this mitigating effect is not present. Additionally, the magnitude of the extensive change in market coverage is much smaller, so the increase from free viewers on the extensive markets is not sufficient to compensate for the loss of ad views on the intensive markets.