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Newspaper habit

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Abstract

This note analyzes the impact of habit formation in media markets on the behavior of a two-sided newspaper platform. Using a simple dynamic approach we find that habit formation (as well as indirect network effects) lead to higher quantities and profits. Price setting, however, strongly depends on network as well as on habit effects.

1.   Introduction

Media markets and especially the newspaper and magazine industry show several characteristics which distinguish them from other industries and markets. Newspapers (and of course also magazines) act as so called two-sided platforms (see Rochet & Tirole, 2003) that connect advertisers with readers. It is broadly understood that readers exert a positive externality on the advertising market as the advertising customers' utility increases with the number of recipients. It is however less clear cut if readers perceive ads as useful or disturbing and if the number of advertisers creates a positive or negative externality for readers. However, it is clear that the two markets are interconnected and that newspapers and magazines are at least partly able to internalize two-sided indirect network effects. Empirical evidence suggests, that newspapers tend to set copy prices just above, at or even below marginal costs. Advertising rates on the other hand tend to be much higher. Hence, the externalities are internalized through the price setting of the two-sided platform.

However, in addition to indirect network effects media markets frequently show also some kind of habituated behavior. Readers of newspapers and magazines, for instance, get used to a specific print medium (newspaper habit). TV viewers, radio listeners and Internet users sometimes get 'addicted' to a specific broadcast, show or Internet service, such as online games and social networks. Recipients then tend to consume the same product with a higher probability in future periods or even consume the product to a greater extend over time. In any case, habit effects increase the consumers' willingness to pay.

Obviously, habituated behavior gives newspapers the opportunity to better plan circulation numbers and adjust the content to the preferences of the (habituated) readers. But besides this, habit effects also influence the firms' price setting behavior and has influence on the interconnection between the two markets.

This note aims at analyzing how indirect network effects and habituated behavior interact and influence prices, quantities and profits in the steady state. We therefore build a simple dynamic model of a monopolistic newspaper serving a reader and an advertising market alike. We find that the reduction of the price on the market with the higher relative externality can be partly lowered through the habit effect. Which in turn allows newspapers with habituated readers to raise prices above marginal costs and exploit the behavior of the readers. As advertisers benefit from the loyalty of the readers, advertising rates also increase. Newspapers facing habituated readership therefore act differently form other two-sided markets and can extract further profits, as indirect network effects are enforced and lowered at the same time. Nevertheless, quantities are always higher with habit effects.

2.   Model

2. 1   Basic setup

Suppose that a monopolistic, say, regional newspaper sells content to readers and advertising space to advertisers. Suppose furthermore that both markets are interrelated by two-sided indirect network effects. Newspapers are therefore typically referred to as two-sided platforms (see Rochet and Tirole, 2003). The inverse demand function of the

advertising market can then be described as

$$r_t = 1 - s_t + gq_t, \tag{1}$$

where r_t is the advertising rate in time t, s_t is the amount of advertising space and q_t is circulation in t. The parameter $g > 0$ indicates the indirect network effect from the reader to the advertising market. To put differently, increasing circulation also increases the willingness to pay for advertising as the advertising rate per reader or contact (r/q) declines with higher circulation.

In the same way inverse demand for newspapers can be described as

$$p_t = 1 - q_t + \eta q_{t-1} + ds_t, \tag{2}$$

where p_t is the copy price in time t. Since q_{t-1} is circulation in $t-1$ newspaper consumption depends on previous consumption indicating myopic habit formation in newspaper reading.[1] Moreover, $\eta < 1$ represents the strength of the habit effect.

Combining inverse demand equation, assuming an infinite lifetime and assuming profit maximization, the monopolistic newspaper maximizes the current value of all (current and future) profits

$$\max_{q_t, s_t} \pi_t = \sum_{t=1}^{\infty} \beta^{t-1}[(1 - q_t + \eta q_{t-1} + ds_t)q_t + (1 - s_t + gq_t)s_t], \tag{3}$$

where $\beta \in [0,1]$ is a constant discount factor. The respective Euler equations to solve the optimization problem are

$$\beta^t \eta q_{t+1} + \beta^{t-1}(1 - 2q_t + \eta q_{t-1} + (d+g)s_t) = 0 \tag{4}$$

for the reader market and

$$\beta^{t-1}(1 - 2s_t + (d+g)q_t) = 0 \tag{5}$$

for the advertising market.

2. 2 Steady state equilibrium

Quantities
Combining the Euler equations and assuming that all quantities are equal in the steady state yields

$$q = \frac{2 + d + g}{4 - (d+g)^2 - 2\eta(1+\beta)} \tag{6}$$

and

$$s = \frac{2 + d + g - \eta(1+\beta)}{4 - (d+g)^2 - 2\eta(1+\beta)}. \tag{7}$$

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[1]Modeling myopic habit formation by assuming that current consumption depends positively on past consumption is the easiest way to assume habituated behavior (see Brown (1952)). Even if there are many more elaborate ways to deal with habit effects this approach is advantageous because of its simplicity, especially in connection with the two-sidedness of the market. For examples of more elaborate models see e.g. Becker and Murphy (1988) for a model of rational addiction or Gruber and Kszegi (2001) for a model of rational habit formation. See also Carrol (2000) for some more literature on this issue.

As can easily be shown, habit formation as well as indirect network effects lead to increasing quantities.[2] In case of one-sided markets both network effects equal zero and therefore quantities reduce to $\bar{q} = \frac{1}{2-\eta(1+\beta)}$ and $\bar{s} = \frac{1}{2}$. In case of two-sided markets without habit formation ($\eta = 0$) q and s reduce to $\hat{q} = \hat{s} = \frac{1}{2-d-g}$. While the effect of the two-sidedness on advertising space is always larger than the effect of habit formation ($\hat{s} - \bar{s} > 0$) the impact on the reader market strongly depends on the parameter values ($\hat{q} - \bar{q} \gtreqless 0 \Leftrightarrow \eta(1+\beta) \gtreqless 2-d-g$). Comparing circulation and advertising space yields that the direct influence of habit formation in reader markets always leads to higher circulation numbers.

Prices
Inserting quantities into inverse demand curves leads to optimal prices

$$p = \frac{(1-g)(2+d+g) - \eta(\beta(2+d)) - g}{4 - (d+g)^2 - 2\eta(1+\beta)} \tag{8}$$

and

$$r = \frac{(1-d)(2+d+g) - \eta(1+\beta)}{4 - (d+g)^2 - 2\eta(1+\beta)}. \tag{9}$$

Starting with the advertising rate (r) yields the (with respect to two-sided markets) well known result that prices are lower when indirect network effects can be exploited. First, without any habit effect the advertising rate is $\hat{r} = \frac{1-d}{2-d-g}$. A higher positive network effect d that is induced by the amount of advertising lowers the advertising rate in order to exploit this effect.

Second, analyzing the advertising rate when network effects are absent ($d = g = 0 \Rightarrow \bar{r} = \frac{1}{2}$) and comparing this price with r it follows that $\bar{r} \gtreqless r$ if $g \gtreqless d$. That is, network effects lead to a lower advertising rate if the effect from the advertising to the reader market is bigger than the opposite network effect (i.e. from the reader to the advertising market). The advertising rate increases in case that the network effect d is strong (i.e. stronger than g).

Furthermore, habit formation has a positive (negative) impact on the advertising rate as long as $d < g$ ($d > g$). To put differently, the advertising rate is higher with habit formation ($\hat{r} = \frac{1-d}{2-d-g} < r$) when the indirect network effect from the advertising market to the reader market (d) is smaller than the indirect network effect from the reader to the advertising market (g).[3] The intuition behind this result is as follows: as habit formation increases circulation and therefore also the demand for advertising space, this positive impact can be exploited best when prices are set according to the network effects. Advertising rates are therefore higher (lower) in markets with habit effects when circulation is more important for advertisers than advertising space for readers (et vice versa).

When analyzing the copy price similar results can be derived. Setting $\eta = 0$ yields $\hat{p} = \frac{1-g}{2-d-g}$. Without habit effects, the copy price is higher with a low network effects from the reader to the advertising market. Setting ($d = g = 0$), i.e. abstaining from network effects, leads to $\bar{p} = \frac{1-\eta\beta}{2-\eta(\beta+1)}$. In this case habit formation has, not surprisingly, a positive impact on the copy price ($\frac{\partial \bar{p}}{\partial \eta} > 0$).

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[2]Note that in comparison to one-sided markets both quantities (q, s) are higher as long as the sum of the indirect network effects ($d+g$) is positive. As $g > 0$ by definition this always holds as long as $|d| < g$ if $d < 0$.

[3]Indeed $\frac{\partial r}{\partial \eta} \gtreqless 0$ if $g \gtreqless d$.

However, when accounting for habit effects and network effects simultaneously results are less straightforward. Analyzing the impact of network effects on p yields that $\bar{p} - p \lesseqgtr 0$ if $g \gtreqless d\frac{1-\eta\beta}{1-\eta}$.[4] Similar as in a world without habit formation a strong network effect from the reader to the advertising market leads to a lower copy price. However, as habit formation increases circulation (and as future profits are at most as valuable as current profits) g has to be even larger than d for decreasing prices. Put differently, a strong habit effect (and also a low discount factor) and therefore higher demand for newspapers enables the newspaper to set higher prices for copies. The effect initiated by the network effect from reader to advertising markets is then damped by habit formation.[5]

Overall, publishers which are able to bind their readership to their newspapers and magazine are able to attract more readers, set higher copy prices and also might set higher advertising rates (in case that $g > d$). Though network effects are still fully internalized, prices would be higher.

Profits
Turning to profits yields $\pi = pq + rs$ or

$$\pi = \frac{(2+d+g)\left[(1-g)(2+d+g) - \eta\left(\beta(2+d)\right) - g\right)\right]}{\left(4 - (d+g)^2 - 2\eta(1+\beta)\right)^2}$$

$$+ \frac{(2+d+g-\eta(1+\beta))\left((1-d)(2+d+g) - \eta(1+\beta)\right)}{\left(4 - (d+g)^2 - 2\eta(1+\beta)\right)^2}. \tag{10}$$

As can easily been shown profits are always higher when readers are habituated to newspapers. The same holds when markets are interrelated by indirect network effects. The newspaper monopolist benefits from habit formation as well as from the two-sidedness of the markets.[6]

3. Conclusion

Two-sided platforms which are facing habituated behavior benefit from both effects positively. Indirect network effects reduce the price on the market which exerts the relatively higher network effect on the other market. This can lead to prices at or below the marginal costs (see, e.g., Kaiser and Wright, 2006). Therefore, it is possible that a loss on one market and correspondingly higher earnings on the other market can be a profit maximizing strategy. The effect of habituated behavior however counteracts this price reduction. Publishers are possibly able to increase copy prices as well as ad rates in case that habit effects are strong and readers are 'more important' to advertisers than vice

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[4]More exactly, analyzing the impact of network effects on p yields that $\hat{p} - p \gtreqless 0$ $g(1-\eta) + d(\eta\beta - 1) \gtreqless 0$. As $\eta\beta < 1$ it follows that $\hat{p} - p \gtreqless 0$ if $g(1-\eta) \gtreqless d(1-\eta\beta)$ or $g \gtreqless d\frac{1-\eta\beta}{1-\eta}$. As $\beta \in [0,1]$ $1 - \eta\beta \leqq 1 - \eta$ g has to be bigger than d plus a mark-up determined by η and β for higher copy prices under habit formation.

[5]Interestingly, a relatively high η (or a low enough *beta*) can theoretically also overcompensate the aggregate network effect such that copy prices are higher than usual monopoly prices in spite of a large g.

[6]As with $\eta = 0$ profits reduce to $\hat{\pi} = \frac{1}{2-d-g}$, the impact of the indirect network effect is always positive. Furthermore as with $d = g = 0$ profits reduce to $\bar{\pi} = \frac{8-4\eta-8\eta\beta+\eta^2+2\eta^2\beta+\eta^2\beta^2}{(4-2\eta-2\eta\beta)^2}$, the derivative $\frac{\partial\bar{\pi}}{\partial\eta} = \frac{(\beta+\beta^2)\eta-2}{(1+\beta)\eta-2)^3}$ is always positive as long as $\beta \leqq 1$ and $\eta < 1$. Since both network effects and habit formation lead to higher profits also a combination of both must lead to an increase in earnings.

versa. However, readers as well as advertisers might suffer from habit effects because of higher prices.

From a competition policy perspective, it is worthwhile to identify habit effects in order to evaluate two-sided media markets. As the habituated behavior of the readership may contradict the possible positive effects that indirect network effects might have on prices, also a negative impact on consumer surplus might be effected.

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