# Semi-Collusion and Antitrust Enforcement in Media Markets

*Preliminary version*

**Konstantinos Charistos**

**Abstract**

This paper underlines the impact of indirect network externalities on the effectiveness of antitrust enforcement to deter collusion in media markets. When two firms that serve both advertisers and readers/viewers agree to collude over advertising, the introduction of investigations and fines does not always render collusion harder to sustain. We show that when readers/viewers are sufficiently ad-averse, fines which are imposed on the profits of the colluding side enhances cartel sustainability. In addition we show that when readers/viewers appreciate advertisements, it is preferable to calculate fines based only on the illegal gain of the colluding side. On the contrary, given that readers/viewers are ad-averse, fines should be calculated on total profits of the media platform.

JEL Classification: K21, L12, L41

Keywords: Antitrust enforcement, Collusion, Media markets

Konstantinos Charistos

Department of Economics, University of Macedonia,

156 Egnatia str., 54006, Thessaloniki, Greece

Tel: +302310891663

e-mail: kostchar@uom.edu.gr

## 1. Introduction

The present paper discusses the effects of anti-cartel policy instruments on two-sided markets. In particular, we examine the case where two platforms agree to semi-collude, increasing prices or reducing quantities over one side and competing over the other. Focusing in media markets, we underline the impact of network externalities on firms' incentive to collude: unlike the single market case, in two sided platforms the effect of a similar policy may result in an ambiguous outcome. This seems possible when a decrease of collusive side's quantity increases sufficiently the non-collusive side's profits.

A critical feature on the analysis of collusion in media markets is consumers' attitude towards advertisements. The evidence is not very clear. Sonnac (2000) shows that European readership seems to be mainly ad-averse. Wilbur (2008) concludes that an increase in advertisement time decreases the median audience size. In accord with evidence above Gabszewicz et al. (2004) and Kind et al. (2014) assume that readers/viewers are ad-avoiders. On the contrary, Kaizer and Song (2009) using data from the German magazine market concludes that consumers mostly appreciate advertisements. Given these mixed conclusions, in this paper we allow readers/viewers to exhibit either aversion or appreciation towards advertising.

The impact of indirect network externalities on firms' incentive to collude is studied by Ruhmer (2011). It concludes that two-sided collusion is harder to sustain when network externalities become stronger and more asymmetric. Evans and Schmalensee (2007) claim that one-sided collusion is never profitable since the supra-competitive profits will be competed away on the non-colluding side. This hypothesis is opposed by Ruhmer (2011), which claims that this effect is not strong enough to render one-sided collusion unprofitable in general. It also shows that collusion seems to be more profitable when firms are able to collude on the side that imposes higher indirect externalities. Dewenter et al. (2011) analyses the impact of collusion in the newspapers market. It shows that semi-collusion on advertising reduces copy prices and advertising and increases readers' surplus.

Our results imply that when firms collude over advertising and compete for readers/viewers, the introduction of monetary fines based only on the profits of the colluding side does not necessarily improve cartel deterrence. In fact, if readers/viewers are ad-averse and appreciate a reduction in the quantity of advertisement caused by collusion, punishing with such fines may enhance cartel

stability compared to the no enforcement case. This results from the fact that the main part of the increase of total profits originate from the competitive side. Furthermore, we show that setting fines on total profits is not necessarily optimal. When the major part of the increase of platform's profits comes from the colluding side (advertisers) it may be preferable to calculate the amount of fine based on this side's illegal gain.

## 2. Model

### *2.1 Basic assumptions*

There are two platforms (firms), $i = 1,2$ which serve two groups of customers, advertisers and readers/viewers, denoted by $s = A, R$ respectively. Each firm maximizes the expected sum of future discounted profits under a common discount factor $\delta \in (0,1)$. During each period a competition *vs* collusion game takes place. If both firms cooperate setting the collusive price or quantity in side $A$, each one earns $\pi_A^m$ from that side and $\pi_R$ from the non-colluding side. When one firm unilaterally deviates from the collusive agreement, it receives $\pi_A^d$ and $\hat{\pi}_R$ from the colluding and the non-colluding side respectively. When firms compete in both markets, each one receives $\pi_{tsm}^n = \pi_A^n + \pi_R^n$. The total defecting and collusive profits of each firm are $\pi_{tsm}^d = \pi_A^d + \hat{\pi}_R$ and $\pi_{tsm}^m = \pi_A^m + \pi_R$ respectively.

Due to resource limitations the Antitrust Authority (AA) investigates the industry with probability $a \in (0,1)$. Without any loss of generality we assume that when the industry is investigated while cartelized each firm is convicted with probability 1. Conviction entails a monetary fine which is a fraction of either the total or the colluding side's illegal profits, i.e. $F_1 = \mu\left(\pi_{tsm}^h - \pi_{tsm}^n\right)$ or $F_2 = \mu(\pi_s^h - \pi_s^n)$ respectively, $h = d, m$ . Evidence related to the collusion can be used by the AA only for one period, so firms cannot be convicted for past violations.

At the beginning of each period firms set the price or quantity for each customer group, sequentially or simultaneously. Consider media that provide time or space to advertisers (side $A$) and sell broadcast or copies to viewers or readers (side $R$), and assume that the two firms decide to collude, but only over the supply of advertising. If collusion is only possible in side $A$ while side $R$ remains always competitive, the following stage game must be considered. If at least one firm refuses to collude, competition takes place at least up to the end of the period. Assuming that a cartel agreement is in effect, each firm chooses between staying loyal to the agreement or to

defect from it. A deviation from the collusive agreement implies that the market will be competitive thereafter (grim strategy). In each period, after both firms have completed their sales, the AA investigates the industry with probability $a$.

*2.2 Strategies and general solution*

First we assume that, in case of investigation, the fine is only related to the collusive side without taking into account any benefits eventually arising from cross-group externalities. Since each semi-colluding firm expects in case of non-investigation to earn the semi-collusive profits $\pi_A^m + \pi_R$ and continue colluding for at least one more period, while in case of conviction, to pay the fine and return to competition forever after, its expected value from remaining faithful to the semi-collusive agreement is:

$$V_{sc}^m = (1-\alpha)(\pi_A^m + \pi_R + \delta V_{sc}^m) + \alpha\left(\pi_A^m - \mu(\pi_A^m - \pi_A^n) + \pi_R + \frac{\delta}{1-\delta}\pi_{tsm}^n\right)$$

which after some rearrangement yields

$$V_{sc}^m = \frac{\pi_A^m - \alpha\mu(\pi_A^m - \pi_A^n) + \pi_R + \alpha\frac{\delta}{1-\delta}\pi_{tsm}^n}{1-\delta(1-a)} \quad (1)$$

Each firm that deviates from the agreement expects to receive $\pi_A^d + \hat{\pi}_R$ and to pay the fine which is based on $\pi_A^d$, if the cartel is convicted with probability $a$. Following a defection, the agreement is interrupted no matter whether the cartel is investigated, and competition takes place for infinite horizon, the value of deviation is therefore:

$$V_{sc}^d = \pi_A^d - \alpha\mu\left(\pi_A^d - \pi_A^n\right) + \hat{\pi}_R + \frac{\delta}{1-\delta}\pi_{tsm}^n \quad (2)$$

The collusive agreement is sustainable as a SPNE of the repeated game for large values of the discount factor. The comparison of (1) and (2) provides the incentive constraint (IC) for cartel stability when two platforms collude on side $A$ and compete on side $R$:

$$\delta \geq \tilde{\delta}_{sc} \equiv \frac{\left(\pi_A^d - \pi_A^m\right)(1-a\mu) + \hat{\pi}_R - \pi_R}{(1-a)\left(\pi_A^d + \hat{\pi}_R - \pi_{tsm}^n - a\mu\left(\pi_A^d - \pi_R^n\right)\right)} \quad (3)$$

Absence of any antitrust policy implies $a = \mu = 0$, in which case the inequality above reduces to

$$\delta \geq \hat{\delta}_{sc} \equiv \frac{\pi_A^d - \pi_A^m + \hat{\pi}_R - \pi_R}{\pi_A^d + \hat{\pi}_R - \pi_{tsm}^n} \quad (4)$$

Setting $\tilde{\delta}_{sc} \leq \hat{\delta}_{sc}$ results to:

$$\frac{\mu\left(\pi_A^d-\pi_A^m\right)\left(\pi_{tsm}^d-\pi_{tsm}^n\right)}{\pi_{tsm}^d-\pi_{tsm}^n+\mu\left(\pi_A^d-\pi_A^n\right)(1-a)}\geq\pi_A^d-\pi_A^m+\hat{\pi}_R-\pi_R \tag{5}$$

Deviation from the cartel agreement in the side $A$ implies selling more advertising than agreed, which in turn increases or reduces the deviator's profits from the side $R$, depending on readers' attitude towards advertising. If consumers like it, deviation from the cartel on side $A$ implies also higher sales and profits from side $R$. However, if readers dislike advertising, a deviation in side $A$ is automatically punished from lower profits from side $R$. While this punishment alone may not be sufficient to deter deviation, when combined with a fine proportional only to the profit from side $A$, it may succeed stabilizing the cartel. The adverse effect of the fine's introduction is due to the fact that the fine increases the relative importance of side $R$ profits. Consumers' dislike of advertising creates already a disincentive for firms to breach the agreement. If on top a fine reduces further the attractiveness of deviation in terms of side $A$ profits, it may end up acting as a collusion-inducing mechanism. Provided that this rise of the profits is sufficient, monetary fines can serve as an umbrella that protects this "eligible" benefit.

This contrast to the single market case where the introduction of investigations and fines always obstructs collusion: had firms operated in a single market, the minimum discount factor that secures collusion would have been:

$$\delta\geq\tilde{\delta}\equiv\frac{(\pi^d-\pi^m)(1-2\alpha\mu)}{(1-\alpha)[\pi^d-\pi^n-\alpha\mu(2\pi^d-\pi^n)]}\geq\frac{\pi^d-\pi^m}{\pi^d-\pi^n}$$

Consider now that the AA following a successful investigation imposes fines on convicted firms which are fraction of the sum of the profits obtained from both sides. In this case each colluding firm expects to earn:

$$V_{sc1}^m=\frac{\pi_{tsm}^m-\alpha\mu(\pi_{tsm}^m-\pi_{tsm}^n)+\alpha\frac{\delta}{1-\delta}\pi_{tsm}^n}{1-\delta(1-a)} \tag{6}$$

Each firm that decides to defect from the colluding advertising level expects to receive:

$$V_{sc1}^d=\pi_{tsm}^d-\alpha\mu\left(\pi_{tsm}^d-\pi_{tsm}^n\right)+\frac{\delta}{1-\delta}\pi_{tsm}^n \tag{7}$$

Setting $V_{sc1}^d\leq V_{sc1}^m$ and solving for $\delta$ provides the minimum discount factor above which collusion can be sustained:

$$\delta\geq\hat{\delta}_{sc}^{ftp}\equiv\frac{\pi_A^d-\pi_A^m+\hat{\pi}_R-\pi_R}{\left(\pi_A^d+\hat{\pi}_R-\pi_{tsm}^n\right)(1-a)}=\frac{\hat{\delta}_{sc}}{1-a\rho} \tag{8}$$

Note that $\hat{\delta}_{sc}^{ftp}$ is always larger than $\hat{\delta}_{sc}$, thus, the introduction of fines on total profits always improves deterrence compared to the no enforcement case. The comparison between $\hat{\delta}_{sc}^{ftp}$ and $\tilde{\delta}_{sc}$ is affected by the preferences of readers/viewers towards advertising, and is analyzed in the next section with the help of a specific model, fully describing preferences and costs.

*2.3 Linear demand example*

Here, we provide a specific demand case, which is also presented in Dewenter et al. (2011). Consider that the advertisers' per reader willingness to pay is:

$$r_i = \kappa - s_i - \beta s_j$$

The quantity of advertising is denoted by $s_i$, while $\kappa$ is the relative size of the advertising market. The differentiation in advertising is denoted with $\beta \in (0,1)$. The consumers' demand for copies is:

$$q_i = \frac{(1-\theta) - (p_i - \theta p_j) + \gamma(s_i - \theta s_j)}{1-\theta^2}$$

where $\theta \in (0,1)$ denotes the differentiation in readers' market and $p_i$ the copy price. The parameter $\gamma$ reflects the readers taste towards advertising. When $\gamma > 0$ the readers are ad-lovers, while if $\gamma < 0$ they are ad-averse. The profits of the firm $i$ from the advertising and the readers' side are $q_i r_i s_i$ and $p_i q_i$ respectively. Finally, we assume that firms first choose the advertising quantities simultaneously, and then compete in copy prices.

In order to obtain the profits as functions of the parameters we solve the two stage game i) when firms compete in both markets, ii) when both firms maximize the joint profits at the first stage and compete at the second stage and iii) when each firm chooses the optimal defection, given that its rival sticks to the collusive advertising quantity.[1]

When consumers evaluate advertisements positively, semi-collusive profits from advertisements are large compared to the respective competitive profits. On the contrary, the semi-collusive profits that originate from side *R* are relatively high when $\gamma < 0$. This implies that (5) is more likely to hold in the latter case: given that the monetary fines are based on profits of side *A*, the incentive to deviate is weakened since the significant cause that increases the total semi-collusive profits, emanates

[1] See appendix

from side $R$. This is possible because the decrease of advertisements induced by collusion is appreciated by ad-averse readers.

Regarding welfare, the surplus of readers/viewers and the profits of both firms are always larger under semi-collusion. However this increase is outweighed by the reduction of advertiser's surplus and semi-collusion seems to have a negative impact on total welfare.

Substituting profits into (3) and (4) we obtain the critical $\delta's$ as functions of $\beta$, $\theta$, $\gamma$, $\kappa$ and the antitrust enforcement parameters.

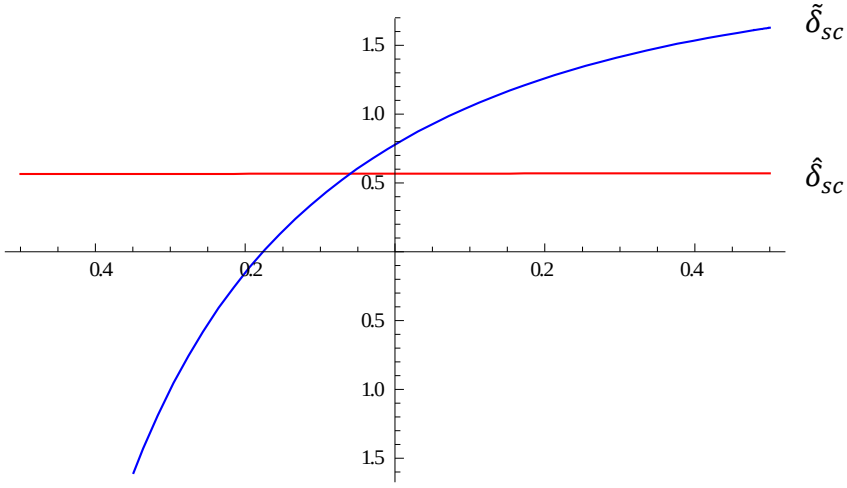
The following proposition summarizes the effect of monetary fines, imposed on the colluding side, on firms' incentive to collude:

*Proposition 1. Consider that two media platforms that serve advertisers and consumers decide to collude over advertising. The introduction of fines which are based only on the profits of the colluding side may enhance cartel stability when consumers exhibit sufficient aversion towards advertising.*

*Proof*

Notice that $\pi^{d}_{tsm} > \pi^{m}_{tsm} > \pi^{n}_{tsm}$ holds $\forall\ \gamma$. Hence, $\hat{\delta}_{sc}$ always lies between 0 and 1. The denominator of $\tilde{\delta}_{sc}$ is positive when $\gamma$ is not too close to -1 and $\tilde{\delta}_{sc}$ is lower than 1 for relatively low values of positive $\gamma$. Solving $\hat{\delta}_{sc} > \tilde{\delta}_{sc}$ shows that semi-collusion over advertising is more possible to be sustained for negative values of $\gamma$.■

In the following graph the red and blue lines represent $\hat{\delta}_{sc}$and $\tilde{\delta}_{sc}$ respectively, while $\gamma$ is on the horizontal axis:[2]




$\theta = \beta = 0.5\ \ \kappa = 1\ \ a = 0.12\ \ \mu = 3$

[2] Bryant and Eckhart (1991) using data from DoJ price-fixing cases, estimated the probability of cartel detection to be between 0.13 and 0.17 in a given year. Combe et al. (2008) estimated the same probability over a European sample to be around 0.13.

Observe that $\pi_A^m$ is lower than $\pi_A^n$ when $\gamma$ is sufficiently small. Thus, when consumers are quite ad-averse, no fine is imposed under these circumstances. Under the parameter values we have already mentioned, semi-collusion is sustainable for $\gamma > -0.67$ and $\hat{\delta}_{sc} > \tilde{\delta}_{sc}$ holds for $\gamma < -0.06$.

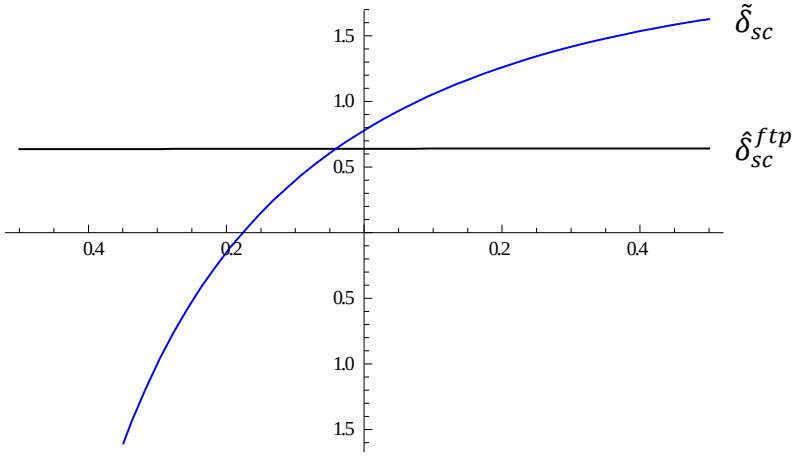
The proposition below states that the base on which cartel fines should be calculated varies with the consumers' attitude towards advertising:

*Proposition 2. When consumers are ad-lovers, fines on total profits are less effective in destabilizing collusion compared to fines which are imposed only on the profits of the colluding side. On the contrary, when consumers are ad-averse, fines on total profits are more effective in deterring the formation of a cartel.*

*Proof*

Simply setting $\hat{\delta}_{sc}^{ftp} > \tilde{\delta}_{sc}$ yields that semi-collusion over advertising is less possible to be sustained for negative values of $\gamma$. In contrast $\hat{\delta}_{sc}^{ftp} \leq \tilde{\delta}_{sc}$ holds for positive values of $\gamma$.■

In the following graph $\hat{\delta}_{sc}^{ftp}$ and $\tilde{\delta}_{sc}$ are depicted by the black and the blue line respectively. Note that $\hat{\delta}_{sc}^{ftp}$ results from a parallel shift of $\hat{\delta}_{sc}$ and that it is also unaffected by $\gamma$. Under the same parameter values the critical value is $\gamma = -0.04$.




$\theta = \beta = 0.5 \;\; \kappa = 1 \;\; a = 0.12 \;\; \mu = 3$

When viewers/readers are adequately ad-averse, i.e. when $\gamma$ is sufficiently small, the major part or entire the increase of the profits caused by semi-collusion originate from the non-colluding side $R$. In this case the imposition of fines on the illegal gain of the collusive side is inferior to the fines imposed on total illegal profits. In contrast,

if the attitude towards advertisements is positive, the increase of the profits caused by semi-collusion comes from the colluding side $A$ and the imposition of fines on the illegal gain of this side is more efficient in terms of cartel deterrence.

## 3. Concluding remarks

An interesting feature of media is that the two sides that constitute the market not only exhibit asymmetric externalities, but also there is strong evidence that the presence of advertisers may hurt readers/viewers. Thus, it is possible that the restriction of the advertisements may increase consumers' willingness to pay. Media firms are able to achieve this by colluding over advertising and competing on the other side, while readers/viewers are ad-averse.

Our goal is to analyze the impact that anti-cartel fines have on firms' incentive to collude and to propose the optimal form under different circumstances. It is known that when a colluding market is one-sided the introduction of inspections and fines always obstructs cartel stability. However, the existence of asymmetric externalities in media markets may produce ambiguous results. In fact, when platforms collude over advertising and readers/viewers exhibit sufficient aversion towards advertising, the imposition of fines based on the illegal profits of the colluding side renders welfare reducing collusion easier to sustain. This happens because punishing the illegal reduction of advertising operates as an umbrella that covers the "legal" increase of the competitive side's profits.

Furthermore, we want to check whether the imposition of fines on total profits of the platform is always superior to the fines that are based only on the colluding side's profits. The answer is that this is also ambiguous and also depends on consumers' attitude towards advertising. We have shown that when the semi-collusive profits of the competitive side (readers/viewers) are relatively low and the profits of the collusive side are relatively large, i.e. when readers/viewers are ad-lovers, the one-sided fines produce better results. Our result imply that if we admit that readers/viewers dislike advertising, it is preferable to calculate fines based on total profits, since the major part of the increase of firms' profits originate from the non-colluding side.

## References

Armstrong, M. (2006) “Competition in two-sided markets” *Rand Journal of Economics*, 37, 668-691

Bryant P.G., Eckhart E.W. (1991) “Price fixing: The probability of getting caught” *Review of Economics and Statistics* 73, 531-536

Combe E., Monnier C., Legal R. (2008) “The probability of getting caught in the European Union”, College of Europe, BEER, Paper No.12

Connor, J.M., Lande, R.H. (2012)”Cartels as rational business strategy: crime pays” *Cardozo Law Review*, 34, 427-490

Dewenter, R., Haucap, J., Wenzel, T. (2011) “Semi-collusion in media markets” *International Review of Law and Economics*, 31, 92-98

Evans, D., Schmalensee, R. (2007) “The industrial organization of markets with two-sided platforms” *Competition Policy International*, 3, 151-179

Gabszewicz, J., Laussel, D., Sonnac, L. (2004) “Programming and advertising competition in the broadcasting industry” *Journal of Economics and Management Strategy*, 13:4, 657-669

Gabszewicz, J., Laussel, D., Sonnac, L. (2005) “Does advertising lower the price of newspapers to consumers? A theoretical appraisal” *Economics Letters*, 87, 127-134

Kaizer, U., Song, M. (2009) “Do media consumers really dislike advertising? An empirical assessment of the role of advertising in print media markets” *International Journal of Industrial Organization*, 27, 292-301

Kind, H-J, Nilssen, T., Sørgard, L. (2014) “Inter-firm price coordination in a two-sided market” Working Paper, Norwegian School of Economics

Ruhmer, I. (2011) “Platform collusion in two-sided markets” Working Paper, Mannheim University, http:// www.vwl.uni-mannheim.de/gk/_ruhmer/tsm_collusion.pdf

Rysman, M. (2009) “The economics of two-sided markets” *Journal of Economic Perspectives*, 23, 125-143

Sonnac, N. (2000) “Readers’ attitude towards press advertising: are they ad-lovers or ad-averse?” *Journal of Media Economics*, 13:4, 249-259

Wilbur, K.C. (2008) "A Two-Sided, Empirical Model of Television Advertising and Viewing Markets", *Marketing Science*, 27, 356-378

**Appendix**

When firms compete in both markets, solving the two-stage game yields the following equilibrium (for further analysis see Dewenter et al. (2011)):

$$s^c = \frac{(\gamma+\kappa)(2-\theta^2)}{4+2\theta-\theta\beta-2\theta^2-\theta^2\beta}$$

$$r^c = \frac{\kappa(2-\theta^2-\theta\beta)-\gamma(2-\theta^2)(1+\beta)}{4+2\theta-\theta\beta-2\theta^2-\theta^2\beta}$$

$$p^c = \frac{(1-\theta)(1+\gamma s^c)-s^c r^c}{2-\theta}$$

$$q^c = \frac{1+\gamma s^c-p^c}{1+\theta}$$

Maximizing the joint profits at the first stage and competing over prices in the readers market, provides the semi-collusive equilibrium:

$$s^s = \frac{\gamma+\kappa}{2(1+\beta)}$$

$$r^s = \frac{\kappa-\gamma}{2}$$

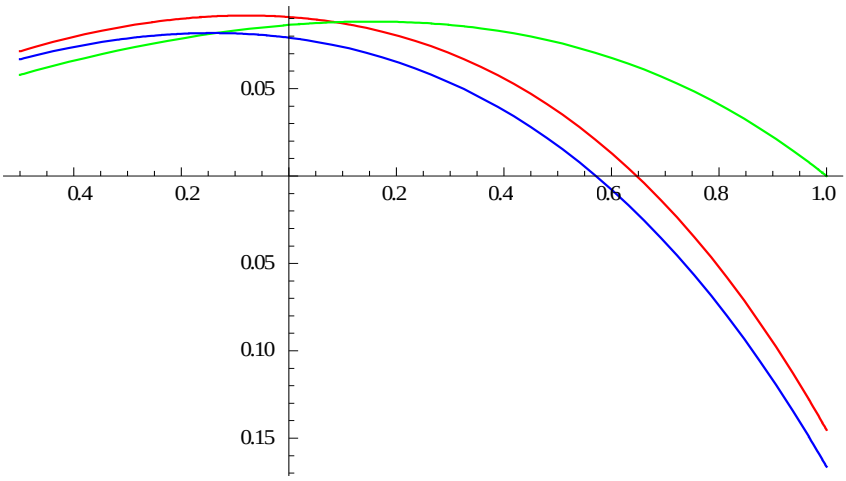
$$p^s = \frac{(1-\theta)(1+\gamma s^s)-s^s r^s}{2-\theta}$$

$$q^s = \frac{1+\frac{(\gamma+\kappa)^2}{4(1+\beta)}}{(1+\theta)(2-\theta)}$$

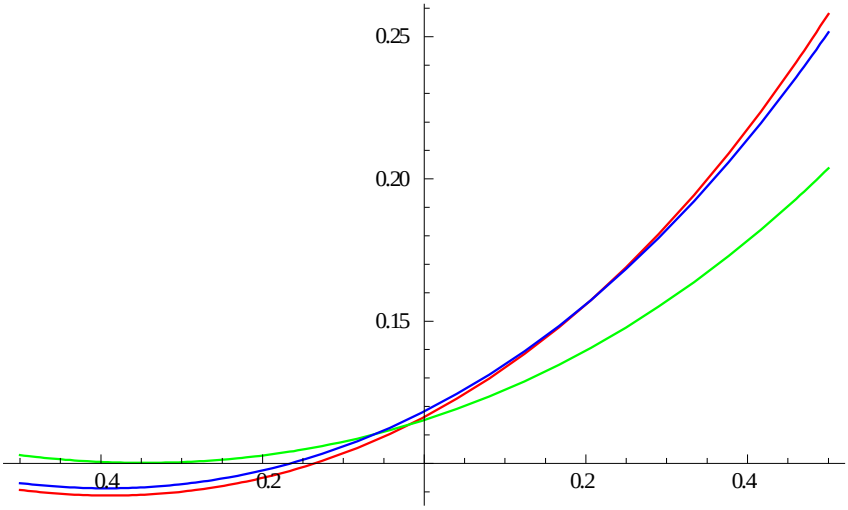
Now consider that each firm believes that the rival will stick to the semi-collusive advertising level. In this case the optimal defection from $s^s$ is the following:

$$s^d = \frac{(4-2\theta^2+\beta(2-\theta)(1+\theta))(\gamma+\kappa)}{4(1+\beta)(2-\theta^2)}$$

Substituting the equilibrium values into $q_i r_i s_i$ we obtain the firm's profits from the adverting side. The diagram below shows the profits as function of $\gamma$ (horizontal axis). The red, green and blue line represent $\pi_A^d$, $\pi_A^m$ and $\pi_A^n$ respectively. We have set $\theta$ and $\beta$ equal to 0.5 and $\kappa = 1$.




The semi-collusive profits that derive from the advertising market are larger than the respective defecting and competitive ones for most positive values of $\gamma$. However, for $\gamma < -0.13$ $\pi_A^m$ is lower than $\pi_A^n$. The respective profits from side $R$ are depicted in the following graph:




Note that $\pi_R$ is relatively large for negative values of $\gamma$: when consumers dislike advertising, the decrease of advertisements caused by collusion has a positive impact on the other side's profits.