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ORIGINAL PAPER

The nature of corruption deterrence in a competitive media sector

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Abstract This paper compares the deterrence provided by a competitive media sector towards government induced corruption with that of a media monopoly in a setting where the media might raise both true as well as false allegations of corruption. It finds that competition's impact on corruption deterrence is not necessarily better than a monopoly but rather hinges on a delicate balance between government's kickback from corruption and the media's potential benefit from exposure. While the paper does identify conditions in which a competitive media sector would improve upon the deterrence provided by a monopoly, it also find conditions under which it would do no better than a monopoly and in some situations its strategic response could be even worse especially when it intensifies effort towards justifying false allegations.

JEL Classification Numbers D72 · H57 · K40 · L10

Keywords Corruption · Deterrence · Media · Governance

1. Introduction

Corruption in governance, be it in the form of embezzlement of scarce state funds, public provision of costly, inefficient or unwanted "white elephant" projects or adoption of policies that benefit only a few (or just the politicians) while harming the majority is a problem that is prevalent in all countries although in varying degrees. Its pernicious effect on economic growth, development and the viability of state institutions has been an important area of research in the economics literature.[1] Accordingly many economists have tried to explore the relative merits of different institutional responses towards mitigating corruption such as introducing checks and balances within the system or altering incentives through rewards and

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[1] Bardhan (1997) and Rose-Ackerman (1999) provide detailed reviews of recent work in this direction. Mauro (1995, 1998) provides some empirical evidence in this regard.

punishment.[2] However, in democratic societies, the informal institution of public scrutiny often plays a critical role in the functioning of governments and the adoption of such institutional changes. Hence the role of the media in shaping the public discourse on government actions is very important. However, it is only recently that economists have begun to analyse various aspects of the relationship between the media and the government as observed in different parts of the globe.[3]

In particular, both Besley and Prat (2002) and my earlier paper Vaidya (2005) point to the deleterious impact of collusion between the media and the government on corruption deterrence. In emerging and transitional economies such as Russia, Brazil and Peru, instances of such media capture by those in power are far from being uncommon.[4] Vaidya (2005) further demonstrates that corruption can persist in equilibrium even in the instances where a monopoly media firm refuses to collude, and makes corruption charges public. Given the government's ability to potentially discredit media's charges, corruption can be attractive even under the impending threat of media allegations. The paper also shows that if the media were to raise false allegations, then it can weaken deterrence by reducing the government's payoff from staying clean. Even if it refrained from corruption, the government would still have to cope with media allegations. Hence given that competing with the media would be unavoidable, the government might prefer to engage in corruption and fight for a bigger stake.

In this paper, I focus on the role of competition within the media towards influencing government's incentive to engage in corruption in the absence of collusion (between the government and the media). This is in contrast to Vaidya (2005) which only examines the case of a media monopoly. In particular, the model developed in this paper allows me to examine whether more firms in the media necessarily provide increased vigilance on corruption as compared to a media monopoly. This is a particularly vexing issue given that the quality of news and the opinions offered by rival media firms is not easy to verify by the public. Hence competition in the market for news need not necessarily be as beneficial as competition in the markets for products with verifiable features. While one could hope for better quality in directly observable dimensions such as printing and the number of beats covered, it is not entirely clear whether competition would necessarily lead to increased pressure for vigilant journalism.[5]

Accordingly, it is hardly surprising that scholars in journalism have devoted some attention to this issue. Both Litman and Bridges (1986) and Lacy (1987) find empirical evidence that competing newspapers tend to devote more resources in producing their papers – a finding they term as "Financial commitment theory". However, White and Andsager (1990) take the view that increased resources spent need not necessarily imply an increase in journal-

[2] For example, Banerjee (1997) discusses how attempts at giving incentives to bureaucrats for allocative efficiency could lead to red-tapism in the distribution of scarce goods. Cadot (1987) provides an analysis of corruption involving different levels of hierarchy within an organization. Marjit and Shi (1998) and Mookherjee and Png (1995) expound on the complexity of the effects of pecuniary incentives to law-enforcement and regulatory officers.

[3] Besley et al. (2002), Besley and Burgess (2001), Besley et al. (2002), Djankov et al. (2003), Stapenhurst (2000), and Stromberg (2001) are some of the papers in this emerging area.

[4] See Albats (1999) and Da Silva (2000). Also see "Untangling Peru's Alleged Web of Crime", Los Angeles Times, February 2, 2001 for an account of how former president Alberto Fujimori's spy chief Vladimiro Montesinos created a hyper corruption network including cabinet ministers, businesspeople, prominent judges and media executives.

[5] In this sense, "news" falls in the category of what Darby and Karni (1973) call "credence goods", something whose quality is difficult to ascertain even after consumption.

istic quality.[6] In their analysis, they attempt at using a more direct measure of journalistic excellence – the winning of a Pulitzer prize.[7] While they do find that newspapers that operate in more competitive environments tend to win more Pulitzer prizes in the coverage of national and international news, there is no such tendency when it comes to local news, something that is covered by all the dailies irrespective of the peculiarities of the markets and the extent of competition.

In this paper, I use a sequential move game to explicitly examine the role of competition within the media towards corruption deterrence. In my analysis, I find that competition's impact on corruption deterrence is not unambiguous. While there are instances where a competitive media setup would clearly improve upon the deterrence provided by a media monopoly even after taking account of the possibility of the media raising false allegations, there are also circumstances where it would do no better than a monopoly and possibly even worse – particularly when it spurs intense effort towards justifying false allegations.

The paper is organized as follows. Section 2 describes the game analysed in the paper detailing its timing and the payoffs to the media firms and government. Sections 3 and 4 present the equilibrium analysis of this game. In particular, section 3 examines the media's optimal responses to the government's choice of whether or not to go for corruption. Section 4 examines how the government's decision to engage in corruption in turn depends on the nature of media's optimal responses to either option and the role competition might play in generating deterrence as compared to a media monopoly. Section 5 concludes the paper.

2. The model

There are three players in the game: the government and two media firms. The government decides whether or not to go for a corrupt deal and two symmetric media firms decide whether or not to raise allegations of corruption upon observing government's choice. The exact timing is as follows. In first stage (stage 1), the government decides whether or not to enter into a corrupt deal which could potentially provide it with an additional payoff of α_G over and above the gain from honest governance (normalized to unity). I denote the decision to pursue corruption as "CR" and refraining from it as "NCR". This decision would critically depend on outcomes in stages 2 and 3. In stage 2, the two media firms observe the government's choice in stage 1.[8] Each firm must decide simultaneously whether or not to pursue allegations of corruption. I denote the decision of a firm to pursue corruption charges as "IN" and avoiding doing so as NI. IN provides an opportunity to create a scandal and profit from enhanced publicity ($\alpha_M > 0$) (increases in circulation and advertising revenues) should the charges be perceived as truthful by the public. If both firms choose IN and win, the profit opportunity would be shared among them as explained later and the government's payoff would be reduced to 0. However, if the government were to successfully falsify such allegations, it would retain the entire stake of $1 + \alpha_G$ while each contending firm would lose some credibility and incur a loss of α_M.[9] NI implies staying away from the controversy altogether. The

[6] In particular, they term interpreting increased resources devoted in generating a newspaper to imply a better quality of journalism a "conceptual leap". See p 913.

[7] However, they admit that doing this is also a "conceptual leap". See p 914.

[8] Introducing imperfect information at this stage of the game would be interesting, but is skipped to keep the analysis simple. The paper focuses on the risk involved in making the news of corruption credible.

[9] I set the magnitude of this loss equal to the potential gain from exposure α_M for notational brevity. The qualitative results of the analysis would go through even if I were to assume the potential loss from being publicly proven wrong to be $\tau\alpha_M$, where $\tau > 0$.

payoff from this option is normalized to zero.[10] I assume that both α_G and α_M are common knowledge between the government and the media. If at least one firm chooses IN, the game proceeds to Stage 3 or the "contest" phase, where the contending parties (the government and at least one of the media firms) having known each other's strategic stance proceed to simultaneously decide on the level of effort each wants to devote towards presenting evidence and arguments so as to influence the public opinion in their favour.

It is worth emphasizing that the model allows for both true as well as false allegations of corruption on the media's part. The government might choose to refrain from corruption but that need not prevent the media from raising allegations of corruption. Hence a payoff of unity from NCR might not be assured and the government might have to fight with the media to retain it. However, the nature of allegations (true or false) would influence the odds which the media firms and the government would face in the ensuing contest to win public opinion. The following "persuasion functions" capture the winning odds of all three contestants when both firms raise true allegations.[11]

$$\pi_{m1} = \frac{pm_1}{p(m_1 + m_2) + (1-p)g},$$

$$\pi_{m2} = \frac{pm_2}{p(m_1 + m_2) + (1-p)g},$$

$$\pi_g = \frac{(1-p)g}{p(m_1 + m_2) + (1-p)g},$$

where $1 > p > 1/2$.

It is easily seen that $\pi_{m1} + \pi_{m2} + \pi_g = 1$.

These functions capture the essence of the tussle between the government and the media towards turning the tide of public opinion in their favour. They posit that each participant's probability of winning not only depends on the size of its effort (the efforts put in by the government and the two media firms are represented by g, m_1, and m_2 respectively) relative to other contestants but also on the parameter p hereafter referred to as the "degree of truth" ala' Hirshleifer and Osborne 2001). The restriction $p > 1/2$ provides the side with the truth (the media in this case) a natural advantage in substantiating its charges. If all the three contestants were to put in the same levels of effort, the overall probability of truth prevailing would be p, greater than the government's probability of squashing the charges as given by $1 - p$. However the assumption $p < 1$ provides an opening for the government to mislead the public and convince it about the veracity of its claims by aggressively competing with the media in providing evidence and rebuttals. The justification for using such functions stems from the premise that in democratic societies with scope for discussion and debate, it is natural to expect the side with the truth to have an innate advantage in substantiating its claims. However, in the absence of a "smoking gun", a lot would also depend on the nature

[10] Strictly speaking, non-participation need not necessarily be risk-free. The firm actively raising allegations could make a dent in the market of the non-participating firm if it were to successfully substantiate its allegations. I have avoided this complication to keep comparisons with a one firm sector manageable.

[11] For a detailed discussion of the axiomatic properties of this class of functions see Clark and Riis (1998) and Skaperdas (1996). Hirshleifer and Osborne (2001), Farmer and Pecorino (1999) and Robson and Skaperdas (2002) employ such a function to model the win probabilities of plaintiffs and defendants in lawsuits. Such functions have also been used to model electoral competitions [see Skaperdas and Grofman 1995; Grossman and Helpman 1996 (except that they use a functional form that depends on the difference in efforts devoted by the contenders) and the impact of advertising expenditures on consumer purchases; see Schmalensee 1978].

of evidence provided and successfully destroyed or kept hidden by the contending parties and hence on the efforts put in by each side towards this cause.[12]

If both the firms were to raise false allegations, the win probabilities of all three contestants would be analogous to those above, except that the degree of truth would be favouring the government. To be precise, these would be:

$$\pi_{\mathrm{m}1} = \frac{(1-p)m_1}{(1-p)(m_1+m_2)+pg},$$

$$\pi_{\mathrm{m}2} = \frac{(1-p)m_2}{(1-p)(m_1+m_2)+pg},$$

$$\pi_{\mathrm{g}} = \frac{pg}{(1-p)(m_1+m_2)+pg}.$$

It is also useful to note that the assumption of risk neutral media firms implies that the expressions $\pi_{\mathrm{m}1}$ and $\pi_{\mathrm{m}2}$ can be interpreted in two ways. For example, in the true allegations case, one could think of $\pi_{\mathrm{m}i}$ as representing the probability that firm i ($i = 1, 2$) beats both the government and its rival in appearing persuasive. As per this interpretation, the entire prize α_{M} goes to only the firm that appears to be most persuasive. Alternatively, one could also think of $\pi_{\mathrm{m}i}$ as representing the share of α_{M} accruing to firm i ($i = 1, 2$) should the media succeed in substantiating the charges of corruption against the government. Hence letting $p(m_1+m_2)/(p(m_1+m_2)+(1-p)g)$ represent the probability of the media emerging successful in substantiating corruption charges, $\pi_{\mathrm{m}i}$ is given by

$$\frac{m_i}{m_1+m_2} \times \frac{p(m_1+m_2)}{p(m_1+m_2)+(1-p)g}.$$

Firm i's share depends on the size of its effort relative to that of the other.

The persuasion functions for the intermediate cases where only one firm investigates can be easily derived from those above by simply substituting the non-participating firm's effort with 0. These intermediate cases are important as they serve as useful reference points to compare the nature of vigilance and deterrence provided by a competitive media sector with a media monopoly. In case of a media monopoly, there would be only one firm and the only possible cases would be these, i.e. either the firm would raise true or false allegations or simply keep quiet. The presence of an additional firm in a competitive media sector allows for additional possibilities; both firms could raise true or false allegations and these could have different implications for the government's incentive to engage in corruption or refrain from it. Hence, a competitive media sector differs from a monopoly to the extent that it adds one more possible claimant to the gain from corruption exposure. The presence of a rival claimant implies that the firms not only compete with the government but also with each other to get the largest share of the benefit from exposure.[13] Such pressure is absent in a monopoly media sector. However, it is important to clarify that in the model examined, the potential gain from corruption exposure (α_{M}) is exogenous and does not vary with the number of firms

[12] Even if each piece of evidence presented were "hard" (see Laffont and Tirole 1993, p 568) and hence verifiable, in the absence of a smoking gun the public's judgment would get influenced by the collection of evidence presented before it. Since collecting such evidence is costly, the side putting in more effort would be able to influence the judgment in its favour even when arguing against truth. See Kadane and Schum (1996) for an interesting discussion of these issues. Daughetty and Reinganum (2000) discuss the biases produced in judgment due to selective presentation of evidence in two-stage trials.

[13] Competing media establishments try hard to get to the "story" first. The firm that is first in bringing the crucial damaging evidence usually gets most of the public attention.

Table 1 Different scenarios under competition and monopoly

Different scenarios	Competitive media sector	Media monopoly
Scenario 1: no firm raises true allegations of corruption	Feasible	Feasible
Scenario 2: only one firm raises true allegations of corruption	Feasible	Feasible
Scenario 3: both firms raise true allegations of corruption	Feasible	Not feasible
Scenario A: no firm raises false allegations	Feasible	Feasible
Scenario B: only one firm raises false allegations	Feasible	Feasible
Scenario C: both firms raise false allegations	Feasible	Not feasible

in the media.[14] Hence, both firms need not necessarily have the incentive to investigate and as explained later, nor is this necessarily for the better especially if both firms prefer to raise false allegations.

To facilitate comparison, Table 1 summarizes and labels the different scenarios possible under the two different market structures.

Which of these scenarios would emerge as an equilibrium response would depend on the nature of expected payoffs to all three players. Given risk neutrality, the persuasion functions, and stakes to different players, the structure of these payoffs is straightforward to anticipate. For example, the expected payoffs to all three players under scenario 3 would be:[15]

$$V_{\mathrm{G}}(\mathrm{CR, IN, IN}) = \frac{(1-p)g}{p(m_1+m_2)+(1-p)g}(1+\alpha_{\mathrm{G}}) - cg,$$

$$V_{\mathrm{M}}^{1}(\mathrm{CR, IN, IN}) = \frac{pm_1}{p(m_1+m_2)+(1-p)g}(\alpha_{\mathrm{M}}) - \frac{(1-p)g}{p(m_1+m_2)+(1-p)g}(\alpha_{\mathrm{M}}) - cm_1,$$

$$V_{\mathrm{M}}^{2}(\mathrm{CR, IN, IN}) = \frac{pm_2}{p(m_1+m_2)+(1-p)g}(\alpha_{\mathrm{M}}) - \frac{(1-p)g}{p(m_1+m_2)+(1-p)g}(\alpha_{\mathrm{M}}) - cm_2.$$

In the above payoffs c represents the constant marginal cost of effort to all three parties. Hence the main source of asymmetry in the expected payoffs would be differences in the stakes (α_{G}, α_{M}) and the degree of truth. The expected payoffs in other scenarios can be constructed exactly analogously to those above and are not presented here for the sake of brevity. Needless to say, by assumption, in scenarios 1 and A, the government would have an assured payoff of $(1+\alpha_{\mathrm{G}})$ and 1, respectively, while the media firms would have a payoff of zero.

In the following two sections I analyse the above game and examine the circumstances under which these different scenarios might emerge as equilibrium of the game. Throughout the analysis, I focus on pure strategies and subgame perfect Nash equilibria. I begin the analysis by examining the media's optimal responses to the government's choice of CR or NCR in the next section.

[14] The potential gain to the media in the form of an increase in readership would be primarily influenced by the nature of the corrupt act itself rather than the underlying market structure.

[15] Notice that these payoffs capture not only the additional rent from corruption but also via the persuasion functions, the associated risk of getting caught and losing the next election. Hence the payoffs also tend to implicitly incorporate the government's concern for re-election.

3. The media's incentive to investigate

3.1. The media's equilibrium responses to CR

Suppose that the government decides to go for CR. Under which conditions do the three alternative scenarios (1–3) emerge as the media's optimal response to the government's choice of CR? I begin with scenario 3 first.

In scenario 3, the government chooses CR and both the firms choose IN. The equilibrium expected payoff to either media firm is:[16]

$$V_{\mathrm{M}}^{*i}(\mathrm{CR, IN, IN}) = \frac{\frac{9}{4}p^2\alpha_{\mathrm{M}} - \frac{(1+\alpha_{\mathrm{G}})^2(1-p)^2}{\alpha_M} - 2p(1-p)(1+\alpha_{\mathrm{G}})}{\left[\frac{3}{2}p + (1-p)\frac{(1+\alpha_G)}{\alpha_M}\right]^2}, \qquad i = 1, 2. \tag{1}$$

A cursory look at the above function reveals that it is monotonically increasing in α_{M} while decreasing in α_{G}. This should not be surprising once one looks at how the efforts of the media firms ($m_1^* = m_2^*$ owing to symmetry) compare with that of the government as in (2) below.

$$g^* = \left[\frac{(1+\alpha_{\mathrm{G}})}{\alpha_M} - \frac{p}{2(1-p)}\right] m_1^*. \tag{2}$$

Clearly, the greater is α_{G} relative to α_{M} the higher is the government's effort relative to the media firms and hence the lower is the media's probability of winning for any given α_{M}. Further, It is clear that both firms would investigate only if $V_{\mathrm{M}}^{*i}(\mathrm{CR, IN, IN}) \geq 0$ for $i = 1, 2$. Using (1), it can be shown that $V_{\mathrm{M}}^{*i}(\mathrm{CR, IN, IN}) \geq 0$if and only if

$$\alpha_{\mathrm{G}} \leq \frac{9}{4 + 2\sqrt{13}} \frac{p}{1-p} \alpha_{\mathrm{M}} - 1. \tag{3}$$

Condition (3) shows that for both firms to investigate, the gain from successful exposure should be sufficiently large relative to the potential gain from corruption to the government. Hence, both firms need not necessarily pursue corruption allegations. Other scenarios as outlined in Table 1 might emerge as equilibrium responses as well. I examine the plausibility of scenario 2 as an equilibrium response next.

In scenario 2, one of the firms (say firm 1) chooses IN while the other firm (say firm 2) prefers NI. This scenario is also equally applicable to the case of a media monopoly where there is only one firm to begin with. The equilibrium expected payoff to the participating firm is:[17]

$$V_{\mathrm{M}}^{*1}(\mathrm{CR, IN, NI}) = \frac{p^2\alpha_{\mathrm{M}} - \frac{(1+\alpha_{\mathrm{G}})^2(1-p)^2}{4\alpha_{\mathrm{M}}} - p(1-p)(1+\alpha_{\mathrm{G}})}{\left[2p + (1-p)\frac{(1+\alpha_G)}{\alpha_M}\right]^2}. \tag{4}$$

As with the previous scenario, this payoff is adversely affected as α_{G} increases relative to α_{M} which is also reflected in the relationship between the efforts of the government and the competing firm as given by (5) below.

$$g^* = \frac{1+\alpha_{\mathrm{G}}}{2\alpha_{\mathrm{M}}} m_1^*. \tag{5}$$

For at least one firm to choose IN, it must be that $V_{\mathrm{M}}^{*1}(\mathrm{CR, IN, NI}) \geq 0$. Given (4), this inequality reduces to:

$$\alpha_{\mathrm{G}} \leq \frac{2}{1+\sqrt{2}} \frac{p}{1-p} \alpha_{\mathrm{M}} - 1. \tag{6}$$

[16] See Appendix B for derivation.

[17] See Appendix A for derivation.

Notice that condition (3) is stricter than condition (6).[18] (α_M, α_G) that satisfies condition (3) automatically satisfies condition (6) but not vice versa. Hence scenario 2 would be the equilibrium outcome when (α_M, α_G) is such that (6) holds but not (3). Together, conditions (3) and (6) identify equilibrium responses of the two firms to CR.

In particular, consider the following zones and Proposition 1:

$$\text{zone 1: where } (\alpha_M, \alpha_G) \mid \alpha_G > \frac{2}{1+\sqrt{2}}\frac{p}{1-p}\alpha_M - 1,$$

$$\text{zone 2: where } (\alpha_M, \alpha_G) \mid \frac{9}{4+2\sqrt{13}}\frac{p}{1-p}\alpha_M - 1 < \alpha_G \leq \frac{2}{1+\sqrt{2}}\frac{p}{1-p}\alpha_M - 1,$$

$$\text{zone 3: where } (\alpha_M, \alpha_G) \mid \alpha_G \leq \frac{9}{4+2\sqrt{13}}\frac{p}{1-p}\alpha_M - 1.$$

Proposition 1 *For given α_M, α_G (> 0) and p $(1/2 < p < 1)$, the media's strategic response to government's choice of CR depends on the relative balance of the potential gains to the two sides:*

In zone 1, neither firm finds it worth raising and justifying allegations of corruption.
In zone 2, only one firm finds it worth pursuing corruption charges.
In zone 3, both firms find it worth pursuing corruption charges.

In zone 1, neither condition (3) nor condition (6) is satisfied and both firms find it in their self-interest to ignore the government's decision to engage in corruption. There is complete self-censorship with the public left in the dark regardless of the underlying media market structure. In zone 2, condition (6) is satisfied but not condition (3). Only one of the firms raises allegations of corruption in a competitive sector. Hence the effective response of competition is no different than a monopoly media setting where the only existing firm would have pursued such allegations. When both firms compete, each firm's share of the prize α_M from exposure is smaller than when only one of them investigates. Accordingly, for there to be adequate incentive for both to investigate, the size of α_M relative to α_G has to be larger. It is only in zone 3 (where both the conditions (3) and (6) are satisfied) that competition becomes effective and both firms expend effort to justify allegations of corruption.

3.2. The media's equilibrium responses to NCR

Analogous to the case of CR, the media's optimal response to NCR is not unique and varies with the size of α_M. In particular, consider the following zones and the associated proposition 2:[19]

$$\text{zone A: where } 0 < \alpha_M < \frac{1+\sqrt{2}}{2}\frac{p}{1-p},$$

$$\text{zone B: where } \frac{1+\sqrt{2}}{2}\frac{p}{1-p} \leq \alpha_M < \frac{4+2\sqrt{13}}{9}\frac{p}{1-p},$$

$$\text{zone C: where } \alpha_M \geq \frac{4+2\sqrt{13}}{9}\frac{p}{1-p}.$$

[18] It can be verified that $2/(1+\sqrt{2}) > 9/(4+2\sqrt{13})$.

[19] The derivation of these zones involves exactly the same kind of analysis as the case with CR except that in this case $\alpha_G = 0$ and the degree of truth p is with the government. Hence the media's equilibrium payoffs for scenario C or B can be easily ascertained by substituting $\alpha_G = 0$ and replacing p with $1-p$ and vice versa in expressions (1) and (4).

Table 2 The government's payoff in different scenarios

Scenarios	Payoff to the government
Scenario 1: government chooses CR, firms do not investigate	$V_G^*(\text{CR, NI, NI}) = 1 + \alpha_G$
Scenario 2: government chooses CR, and only one firm investigates	$V_G^*(\text{CR, IN, NI}) = \frac{(1-p)^2(1+\alpha_G)^3}{[(1-p)(1+\alpha_G)+2p\alpha_M]^2}$
Scenario 3: government chooses CR and both firms investigate	$V_G^*(\text{CR, IN, IN}) = \frac{[2(1-p)(1+\alpha_G)-p\alpha_M]^2}{[2(1-p)(1+\alpha_G)+3p\alpha_M]^2}(1+\alpha_G)$ for $\alpha_G \geq \max\left[\frac{1}{2}\frac{p}{1-p}\alpha_M - 1,\ 0\right]$, 0 otherwise
Scenario A: government chooses NCR and no firm investigates	$V_G^*(\text{NCR, NI, NI}) = 1$
Scenario B: government chooses NCR and only one firm investigates	$V_G^*(\text{NCR, IN, NI}) = \frac{p^2}{[2(1-p)\alpha_M+p]^2}$
Scenario C: government chooses NCR and both firms investigate	$V_G^*(\text{NCR, IN, IN}) = \frac{[2p-(1-p)\alpha_M]^2}{[2p+3(1-p)\alpha_M]^2}$ for $\alpha_M < \frac{2p}{1-p}$, 0 otherwise

Proposition 2 *For given α_M (> 0) and p ($1/2 < p < 1$), the media's strategic response to government's choice of NCR is as follows:*

In zone A, neither firm finds it worth raising false allegations.

In zone B, only one firm finds it worth raising false allegations.

In zone C, both the firms find it worth raising false allegations.

Proposition 2 suggests that as α_M increases, it creates incentives among firms to pursue false allegations. With increases in α_M, there is a movement away from zone A where no firm pursues false allegations to zone B where one firm does so. However, in both zones A and B competition's response is identical to that of a media monopoly – it does not matter whether we have one or two firms in the media sector. However, once α_M gets past a critical threshold, in a competitive sector both firms raise false allegations. This spectre exposes the "darker" side of media competition as it may intensify effort towards justifying false allegations.

Section 4 focuses on the issue of corruption deterrence and examines how the government's equilibrium choice between CR and NCR depends on the nature of media's responses to either option.

4. Comparing the deterrence of a competitive media sector with that of a monopoly

In this section, I focus on the issue of corruption deterrence and examine how the government's equilibrium choice between CR and NCR depends on the nature of media's responses to either option as discussed in section 3. To appreciate this, notice that in stage 1, the government chooses CR as long as its expected payoff from this option is no less than NCR. Along a subgame perfect Nash equilibrium, the expected payoffs to the government from CR and NCR incorporate the media's optimal responses in stages 2 and 3. These are presented in Table 2:[20]

Now consider Proposition 3 which describes the relationship between these payoffs:-

Proposition 3 *For given (α_M, α_G) > 0, and $1/2 < p < 1$:*

[20] See Appendix for derivation of these payoffs. Proofs of propositions presented in this section can be made available upon request.

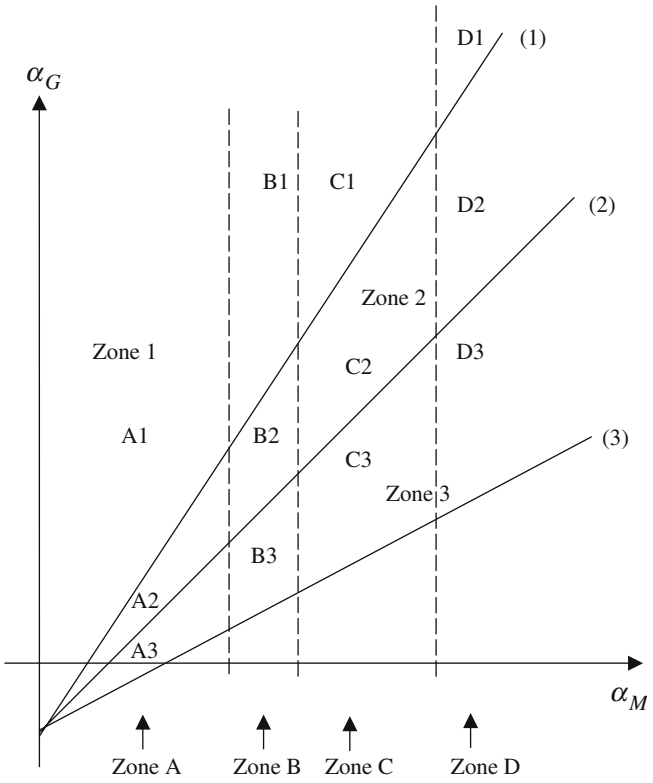

Fig. 1 Competitive media sector versus monopoly

$$(i)\ V_G^*(CR,\ NI,\ NI) = 1 + \alpha_G > V_G^*(CR,\ IN,\ NI) > V_G^*(CR,\ IN,\ IN),$$
$$(ii)\ V_G^*(NCR,\ NI,\ NI) = 1 > V_G^*(NCR,\ IN,\ NI) > V_G^*(NCR,\ IN,\ IN).$$

As is clear from the above proposition, the expected payoff to the government is highest when it engages in corruption and faces no allegations subsequently. Hence a self-censorship on the media's part would be best for the government as it would engage in corruption with impunity. This is exactly what happens in regions A1, B1 and C1 in Figure 1 which graphs the different zones defined in Propositions 1 and 2.[21] In these regions, no firms pursue corruption charges following CR and there is complete self-censorship, irrespective of the underlying market structure.

Further when both firms raise allegations following CR, they tend to enhance deterrence over media monopoly by reducing the expected payoff from CR further than when only one firm investigates. When both firms investigate, each firm's desire to out-compete the other intensifies effort towards justifying corruption allegations. This suggests that emergence of scenario 3 could help enhance deterrence to corruption. In fact, competition does best when

[21] Figure 1 graphically depicts the different zones defined in Propositions 1 and 2. Hence for instance, A1 implies an overlap of zone A and zone 1. Lines (1) and (2) help delineate zones 1, 2 and 3. Hence, the area to the right of line (2) represents zone 3 and to the left, zone 2. Similarly, area to the right of line (1) represents zone 2 and to the left, zone 1. The vertical broken lines help delineate zones A, B, C and D, respectively. Zone D corresponds to the region where $\alpha_M \geq (2p/1-p)$. See the discussion following Proposition 4 for its implications.

both α_G and α_M are smaller with α_M suitably larger than α_G. Hence in regions A3 and B3 in Figure 1, competition unambiguously does better than monopoly in deterring corruption. In these regions, competitive sector generates more effort towards exposing corruption following CR than monopoly as both firms instead of only one investigate following CR while its behaviour with respect to NCR is identical to that of monopoly. In A3 no firms raise false allegations and in B3 only one firm raises false allegations in both the settings. Hence competition enhances deterrence as the payoff to the government from CR is clearly lower than that under monopoly while its payoff from NCR is the same under both settings. Further, in zone 3, unless $1 + \alpha_G > [p/2(1-p)]\alpha_M$ (which is the section of zone 3 to the left of line (3) in Figure 1), the government would not find it worthwhile to put in any effort in its defence following CR and corruption would not be viable.[22]

However, as Proposition 3(ii) suggests, this beneficial aspect of competition must be weighed against the fact that competition might as well intensify effort against justifying false allegations when both firms choose IN – and hence depress the payoff to the government from NCR further below that of monopoly. In regions C3 and D3 these opposing effects exist simultaneously as both firms raise allegations following either CR or NCR in a competitive sector. In the media monopoly case, only one firm would pursue allegations of corruption following either CR or NCR in these regions. Proposition 4, as stated below, summarizes the incentives for corruption in this region.

Proposition 4 *(**i**) In region C3, for $p \in (0.65, 1)$, the sub-region where the government prefers NCR in a competitive media sector strictly contains such region in a monopoly. Hence when monopoly deters corruption, so does competition but not vice versa.*

*(**ii**) In region D3, the government's expected payoff from CR is at least as high as that of NCR in a competitive media sector. In a monopoly setting, there exists a sub-region where the government's expected payoff from NCR strictly exceeds CR.*

As the above proposition makes it clear, the greater effort towards exposing corruption more than offsets the negative effect of higher effort towards substantiating false allegations (part (i)) – but only up to a point. In D3, where $\alpha_M \geq 2p/(1-p)$, the media's cumulative effort towards justifying false allegations is so high that it creates a "chilling effect" – the government does not find it worthwhile to put in any effort towards competing with media's allegations and its expected payoff from NCR collapses to zero.[23] Hence, in this region there is no incentive left at all for the government to refrain from corruption in a competitive sector. However in the case of a media monopoly, such an effect is absent and the government always competes and expects a positive payoff from NCR. This ensures that some incentive for honest governance is preserved.

Further, as α_G becomes large relative to α_M, the competitive media's strategic response to CR converges to that of a monopoly and the media's deterrent effect erodes. Hence in region B2, competition's strategic response is identical to that of monopoly. Only one firm pursues both true and false allegations of corruption under either setting. In C2 its response is perverse. While only one firm pursues allegations following CR under either setting, both firms pursue allegations following NCR in a competitive sector in contrast to only one in monopoly. Further, as Proposition 5 states below, for almost the entire range of p, the government prefers to engage in corruption in these regions under either market structures.

[22] See Appendix B for further discussion.

[23] This can be verified by partially differentiating the government's expected payoff from NCR with respect to g and evaluating the derivative at $g = 0$ and $m^* = \alpha_M/4c$, which is the effort each firm would exert to get the highest share of α_M in the absence of government's effort at countering charges.

Proposition 5 *For (i) $p \in (0.52,\ 1)$ in B2 and (ii) the entire range of p in C2, the government's optimal response is CR.*

5. Conclusion

Does a more competitive media sector lead to enhanced corruption deterrence? The above analysis suggests that much depends on the size of α_G (the government's kickback from corruption) relative to α_M (the media's potential benefit from exposure). Further the absolute size of α_M itself is important as well. For small values of α_M, there are clear instances where competition invokes a better strategic response relative to a monopoly and provides greater deterrence to corruption (as in zones A3 and B3). However, as α_M becomes large, there are instances where it generates more wasteful effort towards substantiating false allegations and even weakens deterrence as compared to monopoly (as in zone D3). It is also interesting to note that firms pursue false allegations despite incorporating concerns about reputation in their decision making – if proved erroneous in the public's eye, both firms stand to lose and they do face a potentially more difficult contest when raising such allegations.

Appendix A. Derivation of equilibrium expected payoffs to the media firms and government under scenario 2

Under scenario 2, government chooses CR and one firm (say firm 1) chooses IN. The expected payoffs to the three players given their efforts are:

$$V_G(\text{CR, IN, NI}) = \frac{(1-p)g}{pm_1 + (1-p)g}(1+\alpha_G) - cg,$$

$$V_M^1(\text{CR, IN, NI}) = \frac{pm_1}{pm_1 + (1-p)g}(\alpha_M) - \frac{(1-p)g}{pm_1 + (1-p)g}(\alpha_M) - cm_1,$$

$$V_M^2(\text{CR, IN, NI}) = 0.$$

In equilibrium, the government chooses g to maximize V_G while firm 1 chooses m_1 to maximize V_M^1 simultaneously. The first-order conditions for these maximization problems are:

$$\frac{\partial V_G}{\partial g} = 0 \Rightarrow \frac{p(1-p)m_1(1+\alpha_G)}{(pm_1 + (1-p)g)^2} = c, \tag{7}$$

$$\frac{\partial V_M^1}{\partial m_1} = 0 \Rightarrow \frac{2p(1-p)g(\alpha_M)}{(pm_1 + (1-p)g)^2} = c. \tag{8}$$

These yield the following relationship between $g^*$and m_1^*:[24]

$$g^* = \frac{1+\alpha_G}{2\alpha_M} m_1^*. \tag{9}$$

Using equation (7) and (9) to solve for m_1^* and g^* and substituting it in the above payoff functions we get the following expressions for equilibrium payoffs to the government and firm 1:

$$V_G^*(\text{CR, IN, NI}) = \frac{(1-p)^2(1+\alpha_G)^3}{[(1-p)(1+\alpha_G) + 2p\alpha_M]^2}, \tag{10}$$

[24] The superscript $*$ denotes optimal values of the variables concerned.

$$V_{\mathrm{M}}^{*1}(\mathrm{CR, IN, NI}) = \frac{p^2\alpha_{\mathrm{M}} - \frac{(1+\alpha_{\mathrm{G}})^2(1-p)^2}{4\alpha_{\mathrm{M}}} - p(1-p)(1+\alpha_{\mathrm{G}})}{\left[2p + (1-p)\frac{(1+\alpha_{\mathrm{G}})}{\alpha_{\mathrm{M}}}\right]^2}. \tag{11}$$

Appendix B. Derivation of equilibrium expected payoffs to the media firms and government under scenario 3

In scenario 3, the government chooses CR and both the firms choose IN. Their expected payoffs are reproduced below:

$$V_{\mathrm{G}}(\mathrm{CR, IN, IN}) = \frac{(1-p)g}{p(m_1+m_2)+(1-p)g}(1+\alpha_{\mathrm{G}}) - cg,$$

$$V_{\mathrm{M}}^{1}(\mathrm{CR, IN, IN}) = \frac{pm_1}{p(m_1+m_2)+(1-p)g}(\alpha_{\mathrm{M}}) - \frac{(1-p)g}{p(m_1+m_2)+(1-p)g}(\alpha_{\mathrm{M}}) - cm_1,$$

$$V_{\mathrm{M}}^{2}(\mathrm{CR, IN, IN}) = \frac{pm_2}{p(m_1+m_2)+(1-p)g}(\alpha_{\mathrm{M}}) - \frac{(1-p)g}{p(m_1+m_2)+(1-p)g}(\alpha_{\mathrm{M}}) - cm_2.$$

The government chooses g to maximize V_{G} and the firms choose m_1 to maximize V_{M}^1, and m_2 to maximize V_{M}^2, respectively. The first-order conditions for the above maximization problems are:

$$\frac{\partial V_{\mathrm{G}}}{\partial g} = 0 \Rightarrow \frac{p(1-p)(m_1+m_2)(1+\alpha_{\mathrm{G}})}{(p(m_1+m_2)+(1-p)g)^2} = c, \tag{12}$$

$$\frac{\partial V_{\mathrm{M}}^1}{\partial m_1} = 0 \Rightarrow \frac{[p^2m_2 + 2p(1-p)g](\alpha_{\mathrm{M}})}{(p(m_1+m_2)+(1-p)g)^2} = c, \tag{13}$$

$$\frac{\partial V_{\mathrm{M}}^2}{\partial m_2} = 0 \Rightarrow \frac{[p^2m_1 + 2p(1-p)g](\alpha_{\mathrm{M}})}{(p(m_1+m_2)+(1-p)g)^2} = c. \tag{14}$$

It is clear from equations (13) and (14) that $m_1^* = m_2^*$ in equilibrium. Given the symmetric payoffs to the two firms, this is what one would expect.

Further,

$$g^* = \left[\frac{(1+\alpha_{\mathrm{G}})}{\alpha_{\mathrm{M}}} - \frac{p}{2(1-p)}\right] m_1^*. \tag{15}$$

Using $m_1^* = m_2^*$ and equations (14) and (15) one can solve for m_1^* and g^*. By substituting them in the above expected payoffs, the following equilibrium payoffs are obtained:

For $\alpha_{\mathrm{G}} \geq \max\left[\frac{1}{2}\frac{p}{1-p}\alpha_{\mathrm{M}} - 1,\ 0\right]$,

$$V_{\mathrm{G}}^*(\mathrm{CR, IN, IN}) = \frac{[2(1-p)(1+\alpha_{\mathrm{G}}) - p\alpha_{\mathrm{M}}]^2}{[2(1-p)(1+\alpha_{\mathrm{G}}) + 3p\alpha_{\mathrm{M}}]^2}(1+\alpha_{\mathrm{G}}) = 0 \quad \text{otherwise}, \tag{16}$$

$$V_{\mathrm{M}}^{*i}(\mathrm{CR, IN, IN}) = \frac{\frac{9}{4}p^2\alpha_{\mathrm{M}} - \frac{(1+\alpha_{\mathrm{G}})^2(1-p)^2}{\alpha_{\mathrm{M}}} - 2p(1-p)(1+\alpha_{\mathrm{G}})}{[\frac{3}{2}p + (1-p)\frac{(1+\alpha_{\mathrm{G}})}{\alpha_{\mathrm{M}}}]^2}, \quad i = 1,\ 2. \tag{17}$$

Notice that the government's payoff from corruption is positive only if

$$\alpha_G \geq \max\left[\frac{1}{2}\frac{p}{1-p}\alpha_M - 1,\ 0\right].$$

Each firm's desire to out-compete the other implies that they would exert some effort ($= \alpha_M/4c$) at exposing corruption even when $g = 0$. Now at $g = 0$, the government's net marginal benefit from an additional unit of effort is given by $\left(\frac{2c(1-p)}{p}\right)\left[\frac{1+\alpha_G}{\alpha_M} - \frac{p}{2(1-p)}\right]$. Hence unless $1 + \alpha_G > [(p/2(1-p))\alpha_M]$, $g^* = 0$ so that $V_G^*(\text{CR, IN, IN}) = 0$.

The equilibrium expected payoffs to the media firms and the government in scenarios B and C can be derived exactly analogously as in scenarios 2 and 3 except that one needs to substitute $\alpha_G = 0$ and replace p with $1 - p$ and vice versa as the degree of truth would favour the government in this scenario.

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