A STUDY OF THE REGULATIVE ACTS' LENIENCY CLAUSE EFFECT ON THE BEHAVIOR OF THE FIRMS

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Abstract

This paper experimentally investigates the effect of leniency clause on cartel formation and self-reporting by firms in an asymmetric cartel. The notion of asymmetric is used in terms of different market share of the firms, which form a cartel. This setting is used to bring the experimental design closer to reality. We experimentally controlled for 'Provision of Deal'- when a firm with larger market share can offer some side payments to the firms with smaller market share and induce them not to report. We run three treatments: 1) Leniency without Deal (LWOD), 2) Leniency with Deal (LWD) and 3) Reward with Deal (RWD). In LWOD treatment players can come forward and self-report their communication to the authority. In LWD treatment before self-reporting there is another step where big players can transfer 10 points to the small player and induce them not to report. In RWD treatment players earn 25 points if they report unlike LWD or LWOD where they paid some amount after reporting as well. The results of the experiment demonstrate that there is no notable difference in the formation of cartels among the three treatments. However, cartel members see the adverse effect of the provision of a deal on the self-reporting of cartels. The incidence of reporting falls significantly from 61.48% in Leniency without Deal treatment to 25.86% in Leniency with Deal treatment. Further, giving positive rewards to the self-reporters counteract the effect of the deal to a large extent. Thus, reporting is remarkably high at 41.44% in Reward with Deal treatment as compared to 25.86% in Leniency with Deal treatment. To sum up, the experiment accentuates the waning effect of leniency clause in asymmetrical cartel.

Keywords: cartels, leniency programs, Bertrand competition, experiment

1. INTRODUCTION

In February 2014, India's Anti-Competitive authority for the first time received an application for imposing a lesser penalty by Phoenix Conveyer Belt, India. This company is a subsidiary of German tyre-making Continental, which disclosed the possibility of a cartel in the conveyor belt segment. Phoenix Conveyer Belt revealed the existence of a cartel engaged in bid rigging for procurement of conveyor belts by several public and private sector companies. Seventeen firms including Sempertrans Nirlon (P) used to decide among themselves the winner and the winning price of the bid. The Competition Commission of India (Lesser Penalty) Regulation, 2009 provides for a reduction in fines to the cartel member if the firm itself reveals the working of a cartel. The investigation is underway; the parties allegedly participating in the cartel are showing a lot

of procedural resistance. Although the CCI has not concluded the matter but if this case is proven, then it will set a precedent for other companies to take the advantage of the leniency program.

Exploitative practices by sellers are not a recent trend. Kautilya in his treatise *'Arthashastra'* stated: *"Merchants who conspire either to prevent the sale of merchandise or to sell or purchase commodities at higher prices shall be fined"* (L.N.Rangarajan, 1992). In modern times, this punishment has taken a legal parlance under the ambit of Antitrust Laws or Competition Policies. These laws regulate the conduct of business corporations, promote vigorous competition and protect the consumers. The general components of competition laws are: prohibiting agreements or practices that restrict free trading, banning abusive behavior by a firm dominating a market and supervising the mergers and acquisitions of large corporations (Competition Act, 2002).

Among the unlawful practices that some of the companies engage in, cartelization that restricts free trade is the most egregious violation of competition laws. They injure consumers by raising prices and restricting supply. Cartels are very secretive in nature and hence it is a herculean task to discover them. Various instruments are used to help Antitrust enforcers in their ability to detect cartels, the most effective being Leniency Programs.

In India too, The Competition Act, 2002 that replaced the archaic Monopolies and Restrictive Trade Practices Act, 1969 has a leniency Clause for whistle blowing companies. It provides incentives to the cartelists who self-report the operations of a cartel to the Antitrust Authority. 'Leniency is a generic term to describe a system of partial or total exoneration from the penalties that would be applicable to a cartel member who reports its cartel membership to a competition enforcement agency' (International Competition Network, 2006). Under the Indian law, the incentives are given in the form of full or less than the full dispensation of penalty if a cartel member makes a true revelation of a professed infringement of section 3 of competition laws.

Here it is to be noted that member firms of a cartel are not necessarily of the same size or working with equal level of efficiency. They are most of the times organizationally different. This asymmetry between firms can be due to different market shares or differences in costs of production. A case illustrative of an asymmetrical cartel is the famous Cement Cartel case in India where Competition Commission of India slapped eleven firms in the cement cartel with the fine of Rs. 6200 crores in 2012. The firms restricted the supply of cement and fixed the prices arbitrarily irrespective of the cost of production of different units. Here, it is to be noted that Ambuja Cements Ltd. served 15% of the market sale while Lafarge India Pvt. Ltd also a member of the cartel, catered only to 5% of the total market. However, the case became known through investigations and not by the use of leniency clause by a cartel member.

This paper employs a particular experiment design to study the effects of leniency clause when the cartels are asymmetric in nature. We deal with differences in market shares of the firms. The rationale behind examining this specific trait of a cartel is that theoretically big firms are more profitable with collusion so they have lesser incentives to blow the whistle. On the other hand, small firms fear that if they are no longer a part of cartel then it will be difficult for them to survive. In this kind of setting, it is also likely that the more powerful firms (having higher share) can influence the smaller firms and the reporting of cartel ceases under leniency programs.

The structure of the paper is as follow. The next section reviews the literature on the effects of leniency clause. Section 3 describes the experiment design. Section 4 gives the results and Section 5 concludes.

2. LITERATURE REVIEW

This section reviews theoretical as well as empirical papers that shed light on how leniency programs affect cartel formation, their stability and prices set by the cartels. It is regarded that one of the first paper was by Giancarlo Spagnolo (2000). The paper considers a Bertrand Duopoly game where two symmetric firms produce a homogenous product and compete in price. He used folk theorem of game theory and demonstrated that the design of leniency programs in U.S and E.U at that time was not optimal but was actually pro-collusive. In Spagnolo (2000) once the firms form a cartel and decide on collusive prices, any of the firms can deviate from the agreement but self-reporting through leniency program makes viable for the non-deviating firm to discipline the tendency of the cheating firm.

Massimo Motta, and Michele Polo, (2001), wrote another paper, which showed the pro-collusive effect of leniency programs. They used an infinitely repeated game and observed a sub-game Nash equilibrium for firms deciding on prices. Firms decide whether they want to deviate or collude and then whether they want to reveal information about the cartel to the authority or not. By allowing colluding firms to pay reduced fines, leniency programs give rise to a perverse effect. Leniency programs in a way reduce the expected cost of misbehavior by the firms. The firms can indulge in anti-competitive practices, earn huge profits and then escape from full penalty. However, given the limited resources of antitrust authority to detect the cartels, Motta and Polo (2001) concluded that leniency programs are effective in the second best perspective.

Further, there are two theoretical papers, which discussed the asymmetric cartels extensively. First one was Evgenia Motchenkova and Daniel Leliefeld (2010) in which they applied a game-theoretical model which deals with asymmetry and retaliation. Their understanding of an asymmetric cartel is in terms of different market shares of the firm. This difference of market share means different collusive profits for the firms when the bigger firm enjoying the extra profits can employ it as a means of coercion. The study analyzed a situation when a big firm (with larger market share) can 'threaten' or 'bribe' the small firm (with smaller market share) and induce them not to self-report. In industries with asymmetry, leniency programs do not always lead to infringement of trust and are unable to break collusion. The bigger firm adopts aggressive strategy and uses coercion to eliminate the option to self-

report for the smaller firm. Studying the sub-game Nash equilibrium in an asymmetric market and fixing certain parameters like exit cost and discount rate Motchenkova and Leliefeld (2010) concluded that collusive equilibrium is sustainable even after leniency programs are introduced.

Kebin Ma (2013) further studied the effectiveness of leniency programs in an asymmetric cartel. They exercised with a duopoly setting where the asymmetry is due to cost differences. There is one low-cost firm (more efficient) and a high cost firm (less efficient) and they decide on how to divide a market, unlike the earlier studies where collusion was done to fix the prices. This study also differs from the Motchenkova and Leliefeld (2010) because now the high cost firms can threaten its low cost partner to self-report the cartel to the authority. The high cost firms in turn get a larger market share than they would have catered otherwise. This leads to stabilization of cartel as well as inefficiency in production and allocation of market share. Kabin Ma (2013) also revealed that when the collusion is to divide the market then low cost firms has stronger incentives to form a cartel as compared to its high cost partner.

From this, we can infer that with the incorporation of asymmetry of cartels in the analysis, the leniency program may become less effective as compared to symmetric cartels. Experimental study of the effect of leniency programs in this kind of setting will deepen our understanding of the mechanism of leniency clause. The policy implication of an experiment with asymmetric cartels will be towards designing more powerful leniency model, which can have deterrent impact on the real world cartels.

Coming to the experimental papers, there have been many experiments conducted to test the efficiency of leniency program in a symmetric setting. The first one was by Jose Apestigua et al. (2003). They played a three-player game with four treatments: STANDARD (players could not report their communication); LENIENCY (penalty was reduced depending on how many players reported); BONUS (for those who report the cartel will get to share among themselves the fines paid by non-reporting cartels); finally, there was an IDEAL treatment (players were not allowed to communicate outright). The experiment concluded that leniency gives the lowest percentage of cartel formation. Market prices are highest in case of BONUS and surprisingly it gives the highest formation of cartels, which is contradictory to the theoretical suggestions that BONUS can have the most success in pre-empting the cartels. The average market price is higher in cases when cartel was formed as compared to those groups who did not form the cartel.

Further with more refinements, a paper was published by Hinloopen and Soetevent (2005). This paper in addition to look at cartel formation and cartel reporting also looked at cartel recidivism. They found that two-third of the cartel formed were broken because one or more members reported the cartel. However, the average number of the cartel formation after the cartel is reported is equal to the average number when the cartels are detected exogenously.

In our experiment, we try to create an environment that is closer to reality. For that reason, we play with asymmetric cartels. The asymmetric characteristic arises with the difference in the market shares of the two firms. We also allow the players to strike a deal between them. This is unlike the experiments done before. To our knowledge, we are the first to have this asymmetric setting and allowing for a side payment between the two players.

3. EXPERIMANTAL DESIGN

We ran three treatments in our experiment: LENIENCY WITHOUT DEAL (LWOD), LENIENCY WITH DEAL (LWD) and REWARD WITH DEAL (RWD). Leniency without Deal is our baseline treatment. The treatments Leniency with Deal and Reward with Deal are nested version of Leniency without Deal. We conducted three sessions for each treatment and the total number of subjects was 84.

The experiment was conducted in the training laboratory of central library at Jawaharlal Nehru University. It was programmed and conducted on z-Tree (Firschbacher, 1999) which requires computers with network connection.

In all the treatments, a repeated discrete Bertrand price setting game is played and the subjects played in a group of two. Subjects played one practice period and then repeatedly for 20 periods. The practice period was played so that participants gain some experience in playing the game. However, the results of the practice period are not counted in the results of this report. No subject participated in more than one session.

The partners were randomly matched at the beginning of the experiment but the subjects played with the same partner in all the rounds. Each player in a group was assigned a particular role, one of them was a big player and the other one is a small player. The roles were randomly given and they arbitrarily changed in each period with the help of z-Tree programming. This means that the subjects played with the same competitor throughout the game but they could be a big player or a small player in a particular round. The roles were displayed on the computer screens to the respective players in the beginning of every round.

In all the treatments each subject has to choose an integer from the set {3,6,9,12,15,18,21,24,27,30}. The market size is taken to be 30 and the cost is normalized to zero. If the two players in a group choose the same price then the big player gets two-third of the market while the small player caters to one-third of it. Subjects started with an endowment of 50 points at the starting of each round.

The payoffs are as follows:

For the Big Player

- If (s)he sets the price less than the price of small player then (s)he earns **'(Own price*30) - 10' points.** This is because the big player can cater to the whole market demand of 30 if their price is less than that of small player except a minimal of 10 points. These 10 points are actually earned by the small player as we see later.
- If (s)he sets the price higher than the price of small player then (s)he earns **'20 points'**

- If (s)he sets the price same as the price of the small player then (s)he earns **'(Own Price*2/3*30) points'**. This is because at the same price the big player can cater to two third of the market.

   For the Small Player

- If (s)he sets the price less than the price of big player then (s)he earns **'(Own price*30) - 20' points.** This is because the small player can cater to the whole market demand of 30 if their price is less than that of big player except 20 points which are still earned by the big player.
- If (s)he sets the price higher than the price of big player then (s)he earns **'10 points'**
- If (s)he sets the price same as the price of the big player then (s)he earns **'(Own Price*1/3*30) points'**. This is because at the same price the small player can serve to one third of the entire market.

   In all the treatments, in Stage I: '**Communication Decision**', each subject decides whether (s)he wants to discuss the prices with their partners. If both the players agree on communicating then a cartel is considered to be formed. Once the cartel is established, Stage II: '**Communication**' appears on the screen when the players can know the minimum acceptable price of each other and then decide their final prices. The communication is however not binding. However, this communication is punishable if it is detected by the authority. In Stage III: '**Pricing**' Subjects were free to decide any number irrespective of what they communicated. If the cartel is not formed, Stage III was directly seen on screen, the subjects decide their prices, and the game ends without any communication among the players.

   After deciding the prices, the game continues according to the treatment run in that particular session. We now discuss our three treatments in detail.

Leniency without deal:

In this treatment, Stage IV was of '**Reporting**' when players can come forward and self-report their communication to the authority.
- In case no one reports and authority itself detects the cartel, the probability for which is 30% then both the players have to pay a penalty of 50 points.
- If one of them reports their communication to the authority then s(he) needs to pay half of the penalty i.e. 25 points while the other one will pay full 50 points.
- If both the players report then each of them will pay 30 points.

Leniency with deal:

In this treatment, before self- reporting there is another step, which is stage V: '**Deal**'. Now, big players can transfer 10 points to the small player and induce them not to report.

- If both the players agree on materializing this side payment then no one can report but the authority can still detect the cartel.
- In case one of the players disagrees, then the deal is not struck and reporting can be done by any of the player.

   The benefit of reporting is same as in the Leniency with Deal treatment. If one of them reports then the fine is 25 points for him and 50 points for the partner. If both report then the penalty is of 30 points for each of the group member.

Reward with deal:

Here the same stage V of '**Deal**' is played and the deal can be made between big and small players as in Leniency with Deal. Big players can transfer 10 points to the small player and induce them not to report.
- If both the players agree on making this side payment then no one can report but the authorities can still detect the cartel with the probability of 30%.
- In case one of the players disagrees, then the deal is not struck and reporting can be done by any of the player. However, the incentives in case of reporting are different. If one of them reports then he will **earn** 25 points while the other will pay 50 points. If both report then 30 points are deducted from each of the cartel member.

   In all the three treatments if the cartel is reported by, either or both the player then detection by authority becomes redundant.

3.1 Hypotheses

In our experiment, we expect that the provision of deal drive players towards communication as the deal will reduce the risk of cartel being reported by the competitor. Giving up 10 points will be agreeable for the big players as they get minimum of 20 points in every round. On the other hand, small players would find it attractive to receive 10 points. Thus, we anticipate that incidence of cartel formation will be higher in 'With Deal' treatments as compared to 'Without Deal' treatment.

   Along with this, we are also interested in observing whether there is difference in the willingness of the big players and the small player in the formation of cartel. Here we expect that as players experience the consequences of communicating and reporting, big players become less willing to communicate in the 'WITH DEAL' treatments as compared to the 'WITHOUT DEAL' treatments. As the big players learn that they often need to give up 10 points after communicating, they may find it less appealing to go for communication at the first stage itself.

   H1. Frequency of cartel formation is higher in the treatments 'WITH DEAL' as compared to 'WITHOUT DEAL'. After experiencing the game, in the later periods, big players will be lesser willing to form the cartel in the treatments 'WITH DEAL' as compared to 'WITHOUT DEAL'.

Leniency without Deal is our benchmark treatment. Theoretically, the leniency clause is less effective when there can be a costless renegotiation between the firms.

H2. Frequency of reporting falls in 'LENIENCY WITH DEAL' treatment as compared to 'LENIENCY WITHOUT DEAL'

The reward treatment gives protection to the whistleblower we foresee a rise in the frequency of reporting in the Reward treatment.

H3. Frequency of reporting under 'REWARD WITH DEAL' treatment will rise as compared to 'LENIENCY WITH DEAL' treatment.

4. RESULTS

During the experiment, player's earnings were represented as points. They were told in the instructions that one point would be exchanged for one rupee (0.016 USD) at the end of the experiment. Average earnings for the subjects were Rs.250 (3.88 USD) and the maximum and minimum payments made were Rs.600 (9.32 USD) and Rs.80 (1.24 USD) respectively. The length of the sessions was between one hour and one hour twenty-five minutes.

4.1 Cartel formation

In this section, we investigate the effects of the different regimes on cartel formation. According to our expectation with the provision of deal, the frequency of forming the cartel should increase.

However, this hypothesis is not upheld by the data. The percentage of cartel formation (when both the players agree to communicate) is more or less same in all three treatments, see table 1.

Table 1. Percentage of cartel formation

Cartel formation	*%*
Leniency With Deal	56.4
Leniency Without Deal	58
Reward With Deal	58.46

This shows that the option of making a deal does not result in more of communication. Contrary to previous experiments, we do not observe increase in cartel formation in the reward treatment also. Probably in reward treatment players were quite certain that, the other player will report and in case both of them reports they will still lose 20 points. Though the fine was lesser than the leniency, treatment but it had consequences on the very first decision of communication.

We now turn to the second part of the hypothesis. It says that with the option of making, a deal the players will be induced to go for communication in the early periods but the frequency of cartel formation will fall later on as the big players will learn the holding up problem. Every time they communicate they had to give 10 points to small player else small players will most probably report the cartel as a punishment to the big player for not giving the bribe.

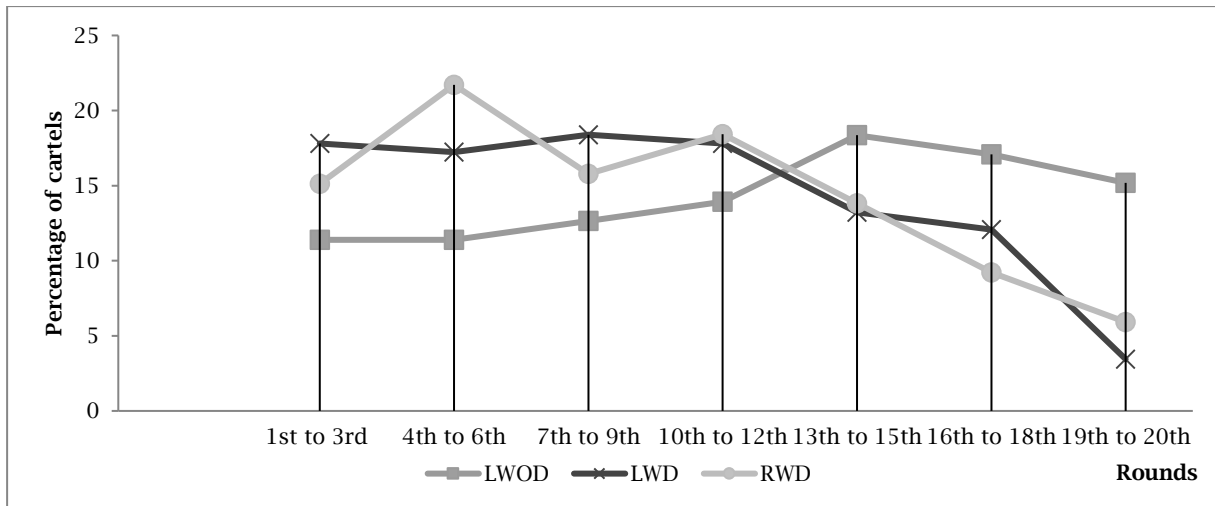**Figure 1.** Fraction of cartels formed in different periods

Figure 1 shows the percentage of cartels in various periods as a percentage of cartels formed in all the periods. As predicted with the option of deal more cartels are formed initially in 'With Deal' treatments but cartel formation falls down in the later rounds. Contradictory, the formation of cartel in 'Leniency without deal' is more towards the end of the game.

Now we look at the cartels, which were not formed and observe the percentages of big players and small players as the total of those who refused to communicate. This is shown in figure 2. We have looked from period 16 onwards as by then subjects have played both the roles of big as well as small

players. Thus, they have known the results of communicating or not communicating and materializing the deal.
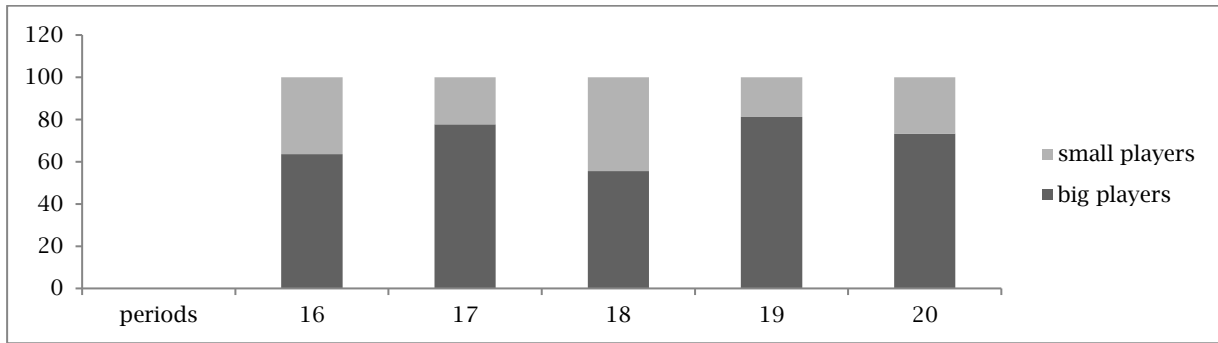
Figure 2(a). Leniency with Deal

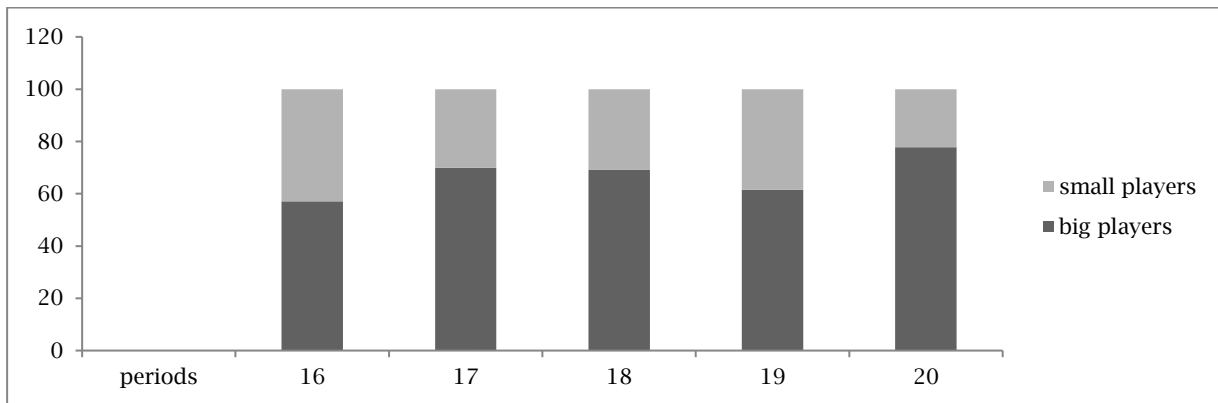**Figure 2(b).** Reward with Deal

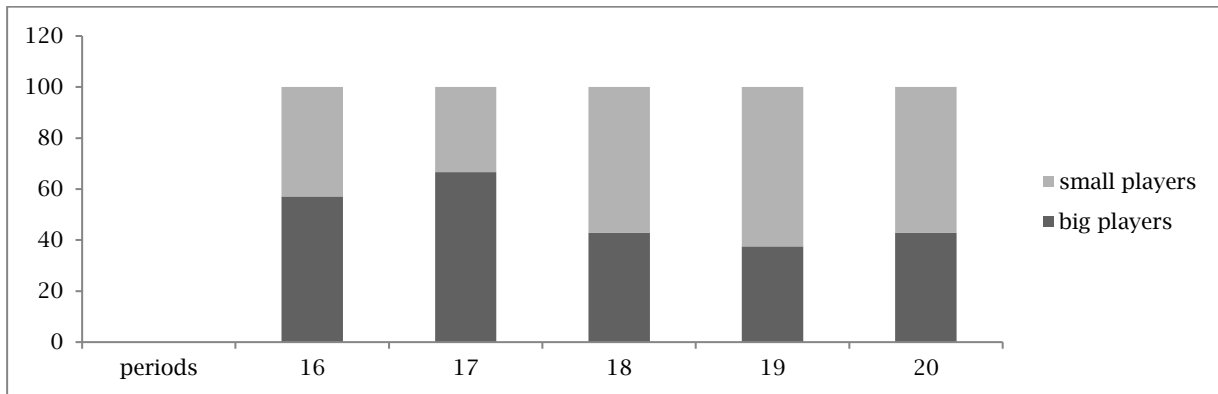**Figure 2(c).** Leniency without Deal

Figure 2, shows that in the later periods, in the treatments 'With Deal' big players are more reluctant to communicate than small players while in the 'Without Deal' treatment the small players are as much opposed to communicate as the big players or sometimes even more. The second part of H1 cannot be rejected.

4.2 Cartel reporting

4.2.1 Leniency with Deal and Leniency without Deal

In the leniency without Deal, out of 148 rounds of communication, number of cartels that were self-reported is 91, i.e. 61.48% of the cartels were reported under the leniency treatment. The effect of leniency clause is appreciated in all the experiments run before. However, we are interested in knowing that how can a provision of side payment by big players to small players affect reporting. In the Leniency with Deal, among 174 rounds of communication, subjects self-reported their communication 45 times i.e. 25.86%. This is in accordance with our hypothesis H2. Figure 3 shows the difference in the percentage of reporting the cartel clearly.

Figure 3. Percentage of cartels that were self-reported in the two treatments
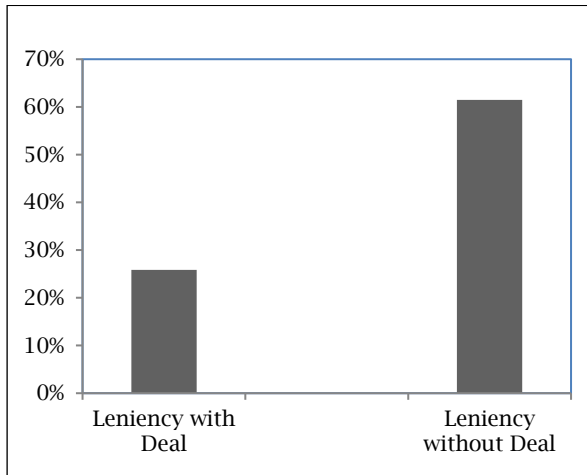
4.2.2 Logistic regression on cartel dissolution with treatments Leniency with Deal and Leniency without Deal

We estimated the following logistic regression model by using data pooled from the Leniency with Deal and Leniency without Deal treatments.

$$\text{Prob (Report=1)} = F[\beta_0 + \beta_1 . \text{Deal} + \varepsilon]$$

Report is a response variable, which is 1 when at least one group member reports the collusion and 0 otherwise. *Deal* is a dummy variable, which is 1 for the leniency with deal treatment and 0 for the leniency without deal and *F* is a logistic function. The estimated coefficients and other statistical information are shown in Table 2 below.

Table 2. Logistic Regression Table with two treatments (Leniency with Deal and Leniency without Deal)

| Variable	Coefficient	Std. Err.	z	p
Constant	.5405676	.1727916	3.13	0.002
Deal	-1.593718	.244604	-6.52	0.000

Notes: Dependent variable: Report (if a cartel is reported =1, otherwise=0)
Number of observation =318, Log likelihood = -194.19944

The negative coefficient of the Deal variable is significant. This shows that with the Deal Treatment the frequency of reporting falls significantly.

4.2.3 Leniency with Deal and Reward with Deal

Initially we expected that in Reward treatment subjects will not go for the side payment and will be more induced to report the cartel. However, data revealed that in RWD out of 152 rounds of communication, deal did take place 74 times i.e. 48.68% while in Leniency with Deal it was 59.19%. One possible reason is that players were still liable to pay 30 points if both report so even in reward treatment they prefer to go for the deal. However, when we looked at the reporting of cartel it came to be 41.44% in Reward with Deal, which was 25.86% in Leniency with Deal. The percentage of those who reported and those who made the deal is not summing up to 100 because there were some rounds when people were communicating but neither made the deal nor reported the cartel. Here, if we look at self-reporting in reward with deal it has definitely increased as compared to Leniency with Deal. Thus, our hypothesis H3 is accepted.

Figure 4. Percentage of cartels that were self-reported in the two treatments
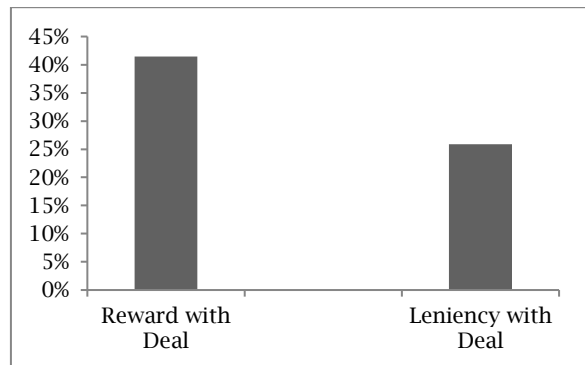
4.2.4 Logistic regression on cartel dissolution with treatments Leniency with Deal and Reward with Deal

Again, we run a logistic function to estimate the coefficients. Now we use pooled data from the Reward with Deal and Leniency with Deal treatments.

Prob (Report=1) = $F[\beta_0 + \beta_1 . \text{Reward} + \varepsilon]$

Report is a response variable, which is 1 when at least one group member reports the collusion and 0 otherwise. *Reward* is a dummy variable, which is 1 for the Reward with Deal treatment and 0 for the Leniency with Deal and *F* is a logistic function. The estimated coefficients and other statistical information are shown in Table 3 below.

Table 3. Logistic Regression Table with two treatments (Leniency with Deal and Reward with Deal)

Variable	Coefficient	Std. Err.	z	p
Constant	-1.05315	.1731305	-6.08	0.000
Reward	.7076483	. 2389208	2.96	0.003

Notes: Dependent variable: Report (if a cartel is reported =1, otherwise=0)
Number of observation = 326, Log likelihood = -202.58372

Here the coefficient of reward treatment is positive and significant. This shows as compared to leniency with deal, the reward treatment has a positive and significant effect on reporting the cartel.

5. CONCLUSION

The introduction of side payment in asymmetric setting leads to lower frequency of reporting both because it cancels out the chances that the other one can report and if the offer is not made then the small players will certainly report. So in order to optimize their earnings and avoiding this risk of self-reporting, players most of the time go for side payments and confirm that they will not report. In real world this may happen in terms of giving a larger market share to the small firms than they actually catered. In the 'Leniency with Deal' around three fifth of the cartels decided to strike the deal and did not report their communication. This observation manifests the adverse effects of the settlement between the big and the small firms on the issue of reporting the cartel. These gratis negotiations among the firms are not difficult to suspect in real world.

Because of the provision of deal in the treatments, the reporting of cartels fell substantially from 61.48% of the cartels in 'Leniency without Deal' treatment to 25.86% of the cartels formed in 'Leniency with Deal' treatments. This implies that we need to increase our incentives for the whistleblowers which report the cartel so that these offerings by big players become less attractive to the small players or the big players themselves become more willing to report the cartel. Our experiment shows that even when bonus was given to cartelists

who self-report, still the deal was materializing in almost half of the cases. This can possibly be reduced further by changing the penalty when both report the cartel in the reward treatment.

Policy implication of this experiment is that in real world where asymmetries are common rather than exception and the dealings between the firms can easily take place just the leniency clause is not very effective. Cartels are undoubtedly very secretive and detecting them is a herculean task. Thus, we need to give more protection or more incentives to the firms so that they come out and self-report their cartel especially when asymmetry can be seen in the cartels. We are hopeful that increasing the reward for applying under the leniency clause will make it a more powerful and efficacious tool in detecting the cartels.

Our experiment deals with only two-player game. This can be extended by making larger groups. To test this with the provision of deal, one should perform another experiment with different group size and compare results with this study. A second extension can be to allow detection probabilities to change over time. A further step would be to make this detection probability a function of the pricing dynamics as in Harrington (2003). In this experiment, we have not seen the fixing and deviation of prices. It would be interesting to note the price differences in asymmetric setting.

The evidence reported in this paper lends support to the view of Noble Laureate Jean Tirole who in a response to the extent of regulation, wrote in his book 'IT DEPENDS'. This suggests customized rules and not just tailor-made clauses. Thus, in cartels with more of asymmetric firms we can reformulate the reduction in fines given to the whistleblowers.

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