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# An Empirical Analysis of the Corporate Leniency Program in Korea: Its Amendments in 2005*

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Abstracts

We investigate the impact of the amended corporate program in Korea using newly collected data on the detected cartels from 1997 to 2010. We find that the amended corporate leniency program has induced more information revelation only to the cases where the leniency was applied. Moreover, it shortened the duration of investigation overall. Finally, it confirms the leniency program's cartel destabilizing effects in the short run.

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## Ⅰ. Introduction

The corporate leniency program has been claimed and applauded as one of the most powerful tools to detect and dismantle cartels in many countries. It provides full or partial exemptions of fines to the applicants that provide information on cartels as long as certain

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conditions are met. Much theoretical literature has attempted to understand the leniency program from a game-theoretical perspective while little empirical literature exists.

Recent and representative empirical papers on the leniency program include Brenner (2009) and Miller (2009). Brenner (2009) applies a reduced regression approach to European Commission data from 1990 and 2003. He finds that greater fines were imposed after the introduction of the leniency program and considers it as evidence of information revealing effects of the leniency program. Further, the leniency program shortened the duration of investigation and made cartels unstable in the short run. But he could not find sufficient evidence of the program's cartel deterring effect. Meanwhile, Miller (2009) based on U.S. cartel indictment and information reports during the period of 1985-2005 tests inference driven from the hypothetical setting. He finds the revision of the leniency program in 1993 resulted in higher cartel detection rate and lower cartel formation rate. While Miller (2009) shows the success of the revised leniency program in U.S., Brenner (2009) attributes his unsuccessful trial in finding cartel deterring effect to a short history of the European Commission's leniency program.

On the other hand, a few empirical literatures on Korea's leniency program including Kim and Kim (2010) and Kwon (2010) exist. Kwon (2010) using a Korean data set from 1999 to 2009 tests Brenner (2009)'s hypothesis and finds the information revealing effect and cartel deterrence effect of the Korea's leniency program. Kim and Kim (2010) using a Korean data from 2005 to 2009 examines the determinants of leniency program application.

Korea is one of the first countries in Asia that adopted the leniency program following the United States and the European Union. In addition, the fact that the Korea's leniency program has

been experiencing many revisions despite its short history provides a natural experiment to test the effectiveness of its amended leniency program.

Therefore, in this study, using a Korean data on the discovered cartels, we investigate two main questions raised by Brenner (2009). First, we explore whether the Korea's leniency program brought information revealing effect, leading to larger amount of fines and less costs in investigation and prosecution. If firms provide information to receive full or partial exemption from fines, that information needs to meet certain conditions and be richer and pertinent enough to penalize involved firms. So the leniency program will induce larger fines. Further, information provided by the leniency applicants helps the antitrust agency save investigation related costs by facilitating investigation, documenting, and prosecuting, i.e., reducing the duration of investigation. So, regarding the first question, fines and duration of investigations per case are used as proxies for the amount of revealed information and costs in the regression analysis.

Second, we examine whether the leniency program has destabilized cartels and changed characteristics of cartels. Harrington and Chang (2009) predict that, if the leniency program is effective in destabilizing cartels, the duration of cartels will increase in the short-run and is ambiguous in the long-run.

We apply a reduced regression approach to the cartel cases with fines imposed. However, before the introduction of the corporate leniency program, Korea had very few cartel cases levied with fines. For instance, from 1982 to 1996 there were total 16 cartel cases, that is, on average, 1 case per year. Due to some missing information, it is hard to cover even these 16 cases in our empirical analysis. So the period of detected cartels in this paper covers from 1997 to 2010 which covers only the periods after the

introduction of the leniency program.

So we test the impacts of the significant "amendments" of the leniency program in 2005. Since we focus only on the detected cartels and do not make any inference on the population cartel including undetected ones, the sample selection bias does not rise in our analysis.

This paper is one of the first papers to attempt an empirical analysis on the leniency program by applying a rigorous regression approach to Korean data. Although this paper is close to Kwon (2010), we have additional tests of the impacts of the leniency program on both initial and final fines imposed by the KFTC as well as on costs of investigation. The data set used in this paper is based on the decision reports by the Korea Fair Trade Commission during the period of 1997 to 2010. It includes characteristics of cartels such as fines, duration of investigations and cartels, and related product market. The fixed and random effect models for the first main question as well as the hazard rate model for the second main questions are applied to this data set.

This paper finds that initial fines, i.e., fines before any deduction, were larger "only" in the cases where the leniency was filed. This suggests that the amended corporate leniency program induced more information revelation "only" to the leniency filed cases after the amendments. This result is different from Brenner (2009)'s result that the leniency program itself has brought information revealing effect to all the cases regardless of the leniency filings. Meanwhile, final fines, i.e., fines after deduction, were not much different across cases regardless of the leniency filings or amendments. Although this may be interpreted that there was no information revealing effect, this result seems more in line with the recent criticism that firms who enjoyed cartel

profit also avoid fines by taking the advantage of the leniency program. This result is different from Brenner (2010)'s result that shows fines even after deduction were still larger after the introduction of the leniency program. Moreover, this paper finds that the program shortened the duration of investigation overall. Finally, it also confirms the leniency program's cartel destabilizing effects in the short run that resulted in the longer duration of cartels.

This paper is organized as follows. Section 2 describes the Korea's corporate leniency program. Section 3 provides an empirical framework and Section 4 discusses the data set. The empirical work is presented in Section 5, and concluding remarks are provided in Section 6.

# Ⅱ. The Corporate Leniency Program in Korea

## 2.1. History and Features of the Corporate Leniency Program in Korea

The Korea Fair Trade Commission (hereafter, KFTC), established in 1980, is Korea's antitrust agency.[1] The KFTC launched the corporate leniency program in 1997 to provide an incentive to firms that self-report their illegal anticompetitive activity.[2] The initial program allowed the incentive of self-reporting, i.e., reduction in

1) In 1994, the Korea Fair Trade Commission became an independent vice-ministerial level body. Since 1996, the KFTC chairman has had the status of a minister.

2) The KFTC's leniency policy is under Article 22-2 (Mitigation of Informants) of the Monopoly Regulation and Fair Trade Law (hereafter, MRFTL) and Article 35 (Criteria for the Mitigation of or Exemption from Punishment for Informants, etc.) of the Enforcement Decree (the Enforcement Decree) under the FTL.

fines, only to the first firm that reports before the KFTC's investigation starts. In 2004, the incentives were given to the first firm that reports either at a pre-investigation stage or at a post-investigation stage. More than 75% of fine is exempted for the first applicant at a pre-investigation stage and less than 50% is exempted for the first applicant that cooperates at a post-investigation stage. The most ground breaking amendments were made in 2005. The full exemption of fines was offered to the first firm at either pre- or post-investigation stages. The second applicant at any stage received 30% reduction in fines. Moreover, the KFTC included an amnesty plus provision that gives amnesty or full leniency to an applicant that, while it is under an on-going investigation of its cartel activity in one area, self-reports another cartel activity which is not under the KFTC's investigation. Further, the KFTC has enacted the notification on corrective orders regarding voluntary reporters of improper concerted acts and the leniency program which contains specific rules regarding the reporting process and standards governing the grant of total or partial exemptions of application sanctions (Jung, Park, and Yun, 2010).[3] The amendments in 2005 were one of the significant changes in the history of the Korea's corporate leniency program, which enhanced its performance by providing more incentives, promoting transparency and granting applicant status automatically. Reduction of fines to the second applicant at any stage increased

3) Sincere cooperation is a prerequisite to a leniency application and the following should be satisfied. First, the applicant shall promptly submit all materials, which is in its possession or can be obtained, related to the concerned cartel. Second, the applicant shall render immediate cooperation upon the KFTC's request that is necessary for fact-finding. Third, each and every employee of the applicant shall cooperate with the KFTC's investigation. Fourth, the applicant shall not deliberately destroy, manipulate, damage, or hide evidence and information related to the concerned cartel. Fifth, the applicant shall not disclose its involvement in a cartel and its leniency application to a third party without KFTC's prior consent.

to 50% in 2007.

【Table 1】 Full or Partial Exemption of Fine in the Corporate Leniency Program

| | pre-investigation stage | | post-investigation stage | |
|---|---|---|---|---|
| Year | First | Second | First | Second |
| 2004 | 75-100% | None | 50%~ | None |
| 2005 | 100% | 30% | 100% | 30% |
| 2007 | 100% | 50% | 100% | 50% |

## 2.2. Performance of the Corporate Leniency Program in Korea

The number of cartels levied with fines has been increasing. In 2005, the number of cartels increased dramatically by around 65 %, shown in Table 2. This increase may be attributed to the increase in the number of leniency filed cases. The ratio of the number of leniency filed cases to total number of cartels levied with fines increased from 6.7% in 1999 to 61.9% in 2009. In terms of the amount of fines, the ratio increased from 0.8% in 1999 to 80.1% in 2009, shown in Table 3. The dramatic changes in the number of leniency filings and the amount of fines of the leniency applied cases were made around year 2005 when significant revisions were made in the leniency program. Before 2005, there was only 1 leniency application per year on average, but more than 11 applications per year from 2005 to 2008. These changes seem to indicate that the revision made the program, which thought to be the unused program, become effective. While some are suspicious about the efficacy or justice of the program in that the firms that enjoyed cartel profits once are also able to escape from fines, many experts and the enforcement agency, the KFTC, attribute successful detection of cartels to the leniency program.

However, more rigorous empirical analysis is needed.

【Table 2】 Numbers of Total Cartel Cases and Leniency Filed Cases

| Year | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Cases | 15 | 15 | 8 | 14 | 11 | 14 | 23 | 27 | 24 | 43 | 21 |
| Leniency Filed Cases | 1 | 1 | - | 2 | 1 | 2 | 7 | 7 | 10 | 21 | 13 |
| Ratio (%) | 6.7 | 6.7 | - | 14.3 | 9.1 | 14.3 | 30.4 | 25.9 | 41.7 | 48.8 | 61.9 |

Source: Kwon (2010) and various sources from the Korea Fair Trade Commission.

【Table 3】 Fines of Total Cartel Cases and Leniency Filed Cases (Unit: 100 million won)

| Year | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Cases | 362 | 1,988 | 236 | 531 | 1,098 | 288 | 2,493 | 1,105 | 3,070 | 2,053 | 529 |
| Leniency Filed Cases | 3 | 0.4 | - | 13 | 34 | - | 1,736 | 550 | 2,214 | 1,506 | 424 |
| Ratio (%) | 0.8 | 0.02 | - | 2.4 | 3.1 | - | 69.6 | 49.8 | 72.1 | 73.3 | 80.1 |

Source: Kwon (2010) and various sources from the Korea Fair Trade Commission.

## Ⅲ. Empirical Framework

We investigate whether the hypotheses that Brenner (2009) tested using the European Commission's data also apply to the case of Korea. So the basic regression equations follow Brenner (2009). However, there are too few observations available on cartel cases before the introduction of the program to test his hypotheses. So we test the impact of the significant revision of the Korea's corporate leniency policy in 2005. The brief observation on the comparison of the performance of the leniency program before and after 2005 tell us that the program had not played a role before 2005.

The first hypothesis is that, with a leniency policy, more

information is revealed to the antitrust agency. Let us assume that the easily obtainable information by the agency will not help firms granted for the full or partial exemption of their fines. So, in order to reduce their fines, self-reporting firms would provide some critical (or high cost) information that, otherwise, would have been difficult for the agency to obtain. If self-reporting occurs, the amount of information available to the agency will increase after the leniency program is established (Brenner, 2009). Since firms do not consider the impact of their self-reporting and providing information on other involved firms, like externality effect, total amount of revealed information is larger with a leniency program. As a proxy for the amount of revealed information, total amount of fines corresponding to a case is used.

In this paper, we hypothesize that the impact of the program on information becomes significant after the revision in 2005. So the testable hypothesis 1 and its corresponding regression equations are as follows.

**Hypothesis 1.** The amount of fines is larger after the amendments of the leniency program in 2005 than before.

$$F_i^{Initial} = a_{11} + a_{12} Y2005_i + a_{13} DC_i + a_{14} NF_i + a_{15} IND + \epsilon_{1ai} \quad (1.1)$$

$$F_i^{Initial} = b_{11} + b_{12} Y2005_i + b_{13} LP_i^{Before} + b_{14} LP_i^{After} + b_{15} DC_i + b_{16} NF_i + b_{17} IND + \epsilon_{1bi} \quad (1.2)$$

$$F_i^{Final} = c_{11} + c_{12} Y2005_i + c_{13} DC_i + c_{14} NF_i + c_{15} IND + \epsilon_{1ci} \quad (1.3)$$

$$F_i^{Final} = d_{11} + d_{12} Y2005_i + d_{13} LP_i^{Before} + d_{14} LP_i^{After} + d_{15} DC_i + d_{16} NF_i + d_{17} IND + \epsilon_{1di} \quad (1.4)$$

where $F_i^{Initial}$ and $F_i^{Final}$ are the total amount of fines to a case imposed by the KFTC before deducting discounts and after deducting discounts, respectively. $Y2005$ is a dummy variable that takes the value of 1 if case $i$ is subject to the leniency program from 2005, 0 otherwise. The duration of the cartel, $DC$, is included as it is likely to have a positive association with fines. $NF$ is the total number of firms involved to each case. $LP_i^{Before}$ is a dummy variable that takes the value of 1 if the leniency was filed for case $i$ before 2005. This term shows difference in fines between leniency filed cases and the rest before 2005. $LP_i^{After}$ is a dummy variable that takes the value of 1 if the leniency was filed for case $i$ after 2005. This term shows difference in fines between leniency filed cases and the rest after 2005, i.e., since the amendment. Industry specific effects, IND, are used as proxy for amount of trade affected by the cartel agreement (Brenner, 2009). According to Hypothesis 1, the coefficient of $Y2005$ is expected to be positive. On the other hand, if we expect that the leniency applicants bring much higher level of information, and hence resulting in higher level of fines, we expect the coefficients of $LP^{Before}$ and $LP^{After}$ to be positive.

The second hypothesis is that more information revealed under the amended leniency program will reduce investigation costs. Information provided by firms may facilitate the antitrust agency's work of collecting data, investigating, writing reports and hence making a final decision. Assuming that costs more with longer investigation, we use the duration of investigation as a proxy for the investigation cost.

**Hypothesis 2.** After the amendments of the leniency program, the duration of investigation and making the KFTC's final decision is

shortened.

$$DI_i = a_{21} + a_{22}\,Y2005_i + a_{23}DC_i + a_{24}DC_i^2 + a_{25}NF_i + a_{26}IND + \epsilon_{2ai} \quad (2.1)$$

$$DI_i = b_{21} + b_{22}\,Y2005_i + b_{23}LP_i^{Before} + b_{24}LP_i^{After} + b_{25}DC_i + b_{26}DC_i^2 + b_{27}NF_i + b_{28}IND + \epsilon_{\varepsilon 2bi} \quad (2.2)$$

where $DI$ is the duration between initiating the investigation, and reaching a decision and $DC^2$ is the square term of $DC$.

The third hypothesis is that, in the short run, after the leniency program is introduced, the duration of cartels will increase. The leniency programs play two important roles: one, which is *ex-ante*, prevents firms from forming a cartel and the other, which is ex-post, detects and desists *on-going* cartels. As the introduction of the leniency programs lowers the expected profitability of a cartel, it may makes some firms give up forming a cartel. Those firms that do not create a cartel in the first place are likely to be ones that are influenced by high degree of uncertainty and instability which lower the expected profitability. Even if the cartel is created, the expected duration of those cartels will be short. Moreover, the introduction of the leniency programs that brings the full or partial exemption of fines will make some firms cheat their co-conspirators and therefore some cartels break down. Those dissolved cartels are also the less stable (or marginal) ones. So the formally stable and long-running cartels will be created in the first place and survive even after the leniency program is introduced. So the detected cartels come from these stable and long running cartels, which leads to the longer duration of detected cartels in the short run (Brenner, 2009; Harrington and Chang, 2009). Meanwhile, the long run effect on the duration of cartels is

ambiguous because, while those stables ones will form leading to longer duration, they will also break, reducing the average duration of cartels. The effect of the leniency program on the duration of a cartel in the short run is tested as follows.

**Hypothesis 3.** After the amendments of the leniency program in 2005, the duration of detected cartels will increase in the short-run.

$$\ln(DC)_i = a_{31} + a_{32}LD_i + a_{33}LP\text{-}ST_i + a_{34}NF_i + a_{35}IND_i + \epsilon_{4i} \quad (3)$$

where $LD$ is the duration of the cartel that operated after the amendments of the leniency program in 2005, $LP\text{-}ST$ is a dummy variable that takes the value of 1 if the cartel is detected during the first three years after the leniency program is amended in 2005, 0 otherwise. The error term, $\epsilon$, follows a Weibull distribution. According to Hypothesis 3, the positive coefficient of $LP\text{-}ST$ is expected to be positive.

The above Equations using industry dummy variables are the fixed effect model equations. For robust check, we also consider the random effect model estimation.

## Ⅳ. Data

The database covers 521 cartel cases falling under Article 19.1 of the Monopoly and Fair Trade Law, which were decided and fined by the Korea Fair Trade Commission (KFTC) between 1982 and 2010.[4] The KFTC's decision reports on these cases are obtained

4) Cartel activities such as price-fixing, market allocation, and bid-rigging that lessen competition are prohibited under Article 19.1 of the Monopoly

from the KFTC's homepage and it includes the names of involved firms, geographic and product markets, and start- and end-dates of the conspiracy, fines imposed on the involved firms and so on. Based on this information, the duration of cartels is calculated. However, since the reports do not state when they started the investigation, we cannot calculate the duration of investigation, i.e., the duration between initiating the investigation, and reaching a decision, which we want to use as proxy for the cost of investigation.[5] Instead, we calculate the duration between the end date of cartels and the date of the KFTC's decision, which is likely to underestimate true values. So, careful interpretation is needed for analysis. Each case's related product market (or industry) is matched with the Korean Standard Industrial Classification (KSIC) of the Korean National Statistical Office.

Among 521 cartels, there are 64 cases from 1982 to 1996, 130 cases from 1997 to 2004, and 329 cases from 2005 to 2010. Among 273 out of 521 cases where fines are levied, there are 16 cases from 1982 to 1996, 93 cases from 1997 to 2004, and 164 cases from 2005 to 2010. After deleting some observations with missing values, 201 cases levied with fines are included in the final data set for the regression analysis. Since we have too few data observations before the introduction of the leniency program to conduct an empirical analysis, we focus the data after leniency program was introduced in 1997. Therefore, comparing only the detected and fine imposed cartels before and after the amendments of the program let our paper free from the sample selection bias born by most cartel related empirical analysis that attempted to

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Regulation and Fair Trade Law (hereafter, MRFTL).

5) To obtain more precise information of the duration of investigation, we need to use the KFTC's information reports and other documents. These are not readily available on the KFTC's homepage. So this is left for future research work.

make an inference on the population of cartels including undetected ones.

【Table 4】 Descriptive statistics

| | Amendments of the leniency program in 2005 | |
|---|---|---|
| | Pre-amendments (1997-2004) | Post-amendments (2005-2010) |
| Number of cases | 84 | 117 |
| Number of the leniency applied cases | 9 | 51 |
| Total fines (after deduction) | 526.60 | 1,425.70 |
| Total fines (before deduction) | 621.78 | 3,628.03 |
| Fines per case(after deduction) | 6.27 | 12.19 |
| Fines per case (before deduction) | 7.40 | 31.02 |
| Fines per firm(after deduction) | 1.16 | 1.35 |
| Fines per firm (before deduction) | 0.98 | 3.43 |
| Average duration of cartels (months) | 16.54 | 23.69 |
| Average duration of investigation(months) | 13.49 | 22.05 |
| Average number of firms | 6.38 | 5.55 |

Notes: Fines are in billion Korean won and durations are in months.

Table 4 shows the descriptive statistics of the data set. There are 84 and 117 cases, respectively, before and after the amendments of the program in 2005. The numbers of the leniency applied cases are 9 and 51, respectively, before and after 2005. Total final fines (after the deduction) are the sum of the final fines levied to all the involved firms in each case after all the deductions of discounts including not only the leniency discounts but also other discounts are made.[6] Total initial fines (before the deduction) are the sum of fines in each case before all the reductions are made.[7]

6) For example, in addition to the leniency discounts, firms may receive discounts because of the bad economy of a specific industry or its structural characteristics or special situation, etc.

7) Since the Korea leniency program keeps the identity of leniency applicants confidential throughout the course of its investigation up to the final judgment of the case, it is difficult to differentiate reduction of fines

Both initial and final deduction fines increased drastically. The average final fines per case doubled from 6 to 12 billion Korean won while the average initial fines per case increased more than 4 times from 7 to 31 billion Korean won. In case of the average fines per firms, smaller increase in the after deduction fines, but large increase in the before reduction fines are observed. This implies larger reduction of fines from year 2005, which is most likely to have resulted from the leniency reduction. This pattern of large increase of fines, but much larger increases of leniency deduction is also observed after the introduction of the leniency program in the European Commission data used by Brenner (2009).

The duration of cartels increased from 16.54 months to 23.69 months. This roughly supports Harrington and Chang (2009)'s prediction in short run. However, more rigorous analysis is carried out in the next section. The duration of investigation also increased from 13.49 to 22.05 months, which is against Brenner's hypothesis that the leniency program will shorten the duration of investigation.[8)]

Regarding cartel characteristics, the number of involved firms per case is 6.38, which is larger than 5.55 before the amendments. The significance of the change in the number of firms per case

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between general reductions and leniency reductions.

8) It has been reported in a Korean news article that the duration of investigation by the KFTC was dramatically shortened in the recent. However, our data tell the opposite. But note that our measure of the duration by its construction provides the minimum duration of investigation. So the conclusion of the news is based on partially selected and widely known cases with shorter duration of investigation rather than the general ones. On the other hand, the empirical analysis in next section shows that the duration of investigation for leniency applied cases are longer. Since we have high proportion of the leniency filed cases after 2005, this may be the reason for the longer average duration of investigation.

leads to open the possibility that there have been some structural changes in industries or cartel firms. Then it will be difficult to predict the impact of the leniency program or derive implications from changes in these variables. For instance, Miller (2009) assumes no structural changes in the formation, detection and dissolution of cartels. Under this assumption, he derives a sufficient condition, i.e., temporary increase followed by a long-term decease of the number of detected cartels, for the leniency program to increase the detection rate and decrease the formation rate of cartels. However, the difference in the average number of firms in our data is positive, but not statistically significant. So we presume that there were no characteristic changes in cartels before and after the amendments.

One of the main reasons to have little empirical analysis on cartel is due to the data limitation. In the first place, gathering useful and usable variables from all the reports is time consuming. In addition, measuring the values of some variables may be subjective, which makes it more difficult to gather data. Previous empirical literature on the leniency program had not been able to incorporate many of important factors in the regression analysis, just focusing on the main variables of the interest as in this paper. Therefore, careful interpretation is required. Second, and the most of all, we observe only the population of "discovered" cartels, not all. In order to measure the impact of the leniency policy, Miller (2009) draws inference from the population of discovered cartels on the population of cartels. Meanwhile, Brenner (2009) compares the impact of the program before and after the introduction of the program on discovered cartel only. In this paper, due to short history of the regulation on cartels, we focus on the comparison of discovered cartels before and after the significant amendments of the program in 2005.

# Ⅴ. Empirical Results

Table 5 shows the estimation results of Equations (1.1)-(1.4). It also includes some modified estimation results in columns (b), (c), (f) and (g). First, we investigate the impact of the leniency amendments on information revelation. Since the corporate leniency program experienced significant amendments in 2005, we include $Y2005$ that takes the value of 1 from 2005, 0 otherwise. Under Hypothesis 1, we expect a significantly positive coefficient of $Y2005$. In column (b) and (f), the dummy variable, $LP$, takes value of 1 if leniency was filed, 0 otherwise. In columns (c), (d), (g), and (h), $LP^{Before}$ ($LP^{After}$) is a dummy variable that takes the value of 1 if the leniency program was applied to a case before (after) 2005, 0 otherwise. The positive association between $LP$ or $LP^{Before}$ ($LP^{After}$) and fines implies that the case where the leniency program was applied received larger fines due to more pertinent information revelation thanks to the leniency applicants.

When the dependent variable is the initial fines before any deduction, the coefficients of $Y2005$ are not statistically significant in columns (a) and (d). This implies that the amendments of the leniency program in 2005 had no impact on fines, and hence no increases in the amount of revealed information.

On the other hand, in column (d), the coefficient of $LP^{After}$ is significantly positive at the 12% level while the coefficient of $LP^{Before}$ is not significant. Only the cases where the leniency was filed for the case after 2005 received larger amount of fine, which implies that more information was revealed. However, since the statistical significance is weak, we tried other specifications. First, in the random effect model estimation of column (d), the coefficient of $LP^{After}$ becomes significantly positive at the 10%

level. Second, after excluding insignificant variable, $Y2005$, we focus more on the difference in fines between leniency applied and non-applied cases in column (b) and (c). These two specification results further imply that the difference in fines between leniency applied and non-applied cases exists after the amendment of the leniency program in 2005. The result that before the amendments, even for the leniency filed cases, not much information was revealed and led to similar level of fines confirms the ineffectiveness of the program before 2005.

【Table 5】 Estimation Results for Equation (1.1)-(1.4)

| Dependent Variable | Fines before deducting discounts($F^{Initial}$) | | | | Fines after deducting discounts($F^{Final}$) | | | |
|---|---|---|---|---|---|---|---|---|
| | (a) | (b) | (c) | (d) | (e) | (f) | (g) | (h) |
| $Y2005$ | 2.00 | | | 0.18 | 1.72 | | | -0.2 |
| | (1.83) | | | (1.82) | (1.83) | | | (0.87) |
| $LP$ | | 2.90* | | | | 1.08 | | |
| | | (1.72) | | | | (0.82) | | |
| $LP^{Before}$ | | | 1.23 | 1.28 | | | 0.88 | 0.78 |
| | | | (3.01) | (3.12) | | | (1.44) | (1.49) |
| $LP^{After}$ | | | 3.48* | 3.41*[a)] | | | 1.15 | 1.29 |
| | | | (1.93) | (2.22) | | | (0.92) | (1.06) |
| $DC$ | 0.11** | 0.10*** | 0.10*** | 0.10*** | 0.04** | 0.04*** | 0.04*** | 0.04*** |
| | (0.03) | (0.03) | (0.03) | (0.03) | (0.01) | (0.01) | (0.01) | (0.01) |
| $NF$ | 0.09 | 0.03 | 0.03 | 0.01 | 0.00 | 0.01 | 0.01 | 0.00 |
| | (0.18) | (0.15) | (0.15) | (0.15) | (0.07) | (0.07) | (0.07) | (0.00) |
| $CONSTANT$ | -1.81 | -1.13 | -1.03 | -0.92 | -0.04 | -1.72 | -1.60 | -0.06 |
| | (1.71) | (1.31) | (1.32) | (1.49) | (0.70) | (0.63) | (0.63) | (0.74) |
| $IND(39\ industries)$ | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| $R^2$ | 0.14 | 0.15 | 0.15 | 0.11 | 0.14 | 0.10 | 0.10 | 0.10 |

Notes: [a)] Significant at the 12% level, but significant at the 10% level in the random effect model.
***, **, * : 1%, 5%, 10% significance

The fines of these leniency-applied cases are 3.41-3.48 billion Korean won higher than other cases. This implies that it failed to

bring much information revelation overall, but only to the cases where the leniency applicants brought information. These results, inconsistent with Brenner (2009), do not support Hypothesis 1, but we can say that it supports the modified version of Hypothesis 1 that more and pertinent information revelation is obtained with the leniency filing, leading to higher fines.

Meanwhile, we expect that the duration of cartels, $DC$, is likely to be associated with larger damages and hence with larger fines. Our result shows that the coefficient of $DC$ is significantly positive as we expected.

For the robust check, the fixed effect model with both 2 digit industry dummy variables and 1 digit industry dummy variables has been estimated where there are 9 and 36 industry dummy variables, respectively, under the 1 digit and 2 digit industry classification. In addition, as mentioned before, the random effect model has been estimated and the Hausman test has been carried out. They provide the same results as shown in Table 5.[9] The statistical significance of the coefficient of $LP^{After}$ becomes much stronger with the 1 digit industry dummy variable specification and the random effect model specification.[10] On the other hand, there would be many important factors such as types of cartels and market shares of involved firms in determining fines that this paper could not incorporate due to the limited data.[11] So, careful interpretation of empirical analysis is needed.

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9) In the Hausman test, we do not reject the null hypothesis that the coefficients between the fixed effect and the random effect models are the same. So the random effect model estimation provides more efficient estimates.

10) In both the random effect model specification and the fixed effect model specification using the 1 digit industry dummies, the coefficients of $LP^{After}$ are significant at the 10%.

11) For instance, Kwon (2010) finds that bid rigging cases had lower fines. On the other hand, Kim and Kim (2010) show the bid rigging cases do not increase the basic surcharge rate.

When the dependent variable is the fines after we deduct all kinds of discounts, the results are shown in columns (e)-(h). The dependent variable is the actual fines that firms pay. In this case, neither $Y2005$ nor leniency filing related dummy variables is statistically significant while the coefficient of $DC$ is still significantly positive. This implies that there is not much difference in per-case fines whether the leniency is filed or not. One possible reason for this is that, even though the leniency applicant provides higher level of information, leading to higher level of fines, the discounts received by the applicants are so large that they cancel out the increase of fines. Although we do not ignore the impact of the leniency program in preventing the formation of cartels, this reasoning is in line with the criticism on the leniency applicants that, once who enjoyed cartel profits the most, receive full or partial exemption of fines. In addition, the simple comparison of the descriptive statistics from Brenner (2009) and this paper - that is, comparing the EU data and Korea data - shows that the reduction of fines per firm in Brenner (2009) is about 40% while the reduction of fines per firm in the Korean data of this paper's data is about 60%. This may be why Brenner (2009) shows the leniency program is positively associated with fines even after the discounts are deducted, but ours do not. There have been voices over the revision on the exemption rate of the fines. One suggestion raised is to disqualify the ringleaders for the application of the leniency program like in the U.S.'s leniency program. After lots of criticism was made to huge leniency discounts, the former chairman of the KFTC also made favorable comments on that suggestion, but no further progress has been made. In addition, more rigorous and careful analysis needs to be made by taking into account the cartel deterring effect of the leniency program.

【Table 6】 Estimation Results for Equation (2.1)-(2.2)

| Dependent Variable | $DI$ | | | |
|---|---|---|---|---|
| | (a) | (b) | (c) | (d) |
| $Y2005$ | -3.50 | | | -4.73** |
| | (2.29) | | | (2.72) |
| $LP$ | | 6.13*** | | |
| | | (2.57) | | |
| $LP^{Before}$ | | | 11.87** | 9.80** |
| | | | (4.34) | (4.47) |
| $LP^{After}$ | | | 4.07** | 6.87** |
| | | | (2.84) | (3.25) |
| $DC$ | 0.19* | 0.08 | 0.07 | 0.12 |
| | (0.11) | (0.11) | (0.11) | (0.10) |
| $DC^2$ | -0.00 | -0.00 | -0.00 | -0.00 |
| | (0.00) | (0.00) | (0.00) | (0.00) |
| $NF$ | 0.06 | 0.10 | 0.13 | 0.11 |
| | (0.23) | (0.23) | (0.23) | (0.23) |
| $CONSTANT$ | 9.45 | 7.89 | 7.40 | 11.58 |
| | (10.08) | (9.84) | (9.780) | (10.02) |
| $IND(39\ industries)$ | Yes | Yes | YES | Yes |
| $R^2$ | 0.28 | 0.29 | 0.30 | 0.32 |

Note : ***, **, * significant at the 1%, 5%, 10% level.

Table 6 shows the estimation results of Equations (2.1)-(2.2). Regarding Hypothesis 2, column (a) shows the impact of the amendments of the leniency program on the duration of investigation is negative, but not statistically significant. In column (b), we find that the leniency filed cases have longer duration of investigation. Column (c) further shows that before the amendments, the duration for the leniency filed cases was longer than the one after the amendments. The difference is statistically significant. Column (d) shows that the coefficients of $Y2005$, $LP^{Before}$ and $LP^{After}$ are significant. The negative coefficient of $Y2005$ implies overall decrease in the duration of investigation after the amendments. The coefficients, $LP^{Before}$ and $LP^{After}$ are all

positive. This implies that duration of investigation is much longer for the leniency applied cases. Relative to the base group of the leniency non-applied cases before the amendments, the duration for the leniency applied cases before the amendments is 9.8 months longer and the duration for the leniency applied cases after the amendments is 2.14 months longer.[12] In short, the amendments of the program shortened the duration of investigation although the duration of investigation is still longer for cases where the leniency is applied. Therefore, this result supports Hypothesis 2. Meanwhile, the cartel duration, $DC$, does not affect the duration except in column (a).

Table 7 shows the estimation results of Equation (3). It investigates the impact of the amendments of the leniency program on cartel stability, specifically, the duration of cartels. According to Harrington and Chang (2009)'s prediction, the duration of cartels will increase in the short run, but will be ambiguous in the long run. In the short run, the dissolution of marginal cartels in the first place lengthens the duration of cartels. But in the long run, even stable cartels with longer duration dissolve and shorten the duration of cartels. So the overall impact on the cartel duration in the long run is an empirical question. The significantly positive coefficient of LP-SP is consistent with Harrington and Chang (2009)'s prediction and hence supports Hypothesis 3. This result implies that the Korea leniency program after its amendments has had quite successful influence of destabilizing cartels. This is the opposite result to Brenner (2009) that shows insignificant coefficient of LP-SP and hence, did not find the cartel destabilizing influence of the leniency program in the European Commission. Brenner (2009) attributes his result to the coverage of data that include only several years after the

12) The sum of the two coefficients, $LP^{After}$ and $Y2005$ implies 2.14 months.

introduction of the leniency program in the European Union. Although the leniency program has experienced revisions, his data cover only a couple of year, which is too short to measure the impacts of the amended leniency program. Meanwhile, the coefficients of the duration during which the cartel operated under the leniency program are positively significant. The longer LD, the longer cartel duration suggests that, at least for our sample period, the impact of the dissolution of marginal cartels is larger than the impact of the dissolution of cartels. However, there are only five years of data since the amendments in 2005. So it is hard to tell this one shows the long run effect of the leniency program.

【Table 7】 Hazard rate estimation result for Equation (3)

| Dependent Variable: $\ln(DC)$ | |
|---|---|
| $LD$ | 0.97*** |
| | (0.01) |
| $LP\text{-}SP$ | 0.74* |
| | (0.13) |
| $NF$ | 1.00 |
| | (0.02) |
| $IND(39\ industries)$ | YES |
| $1/\ln p$ | 0.21 |
| $P$ | 1.23 |
| $Log\text{-}likeliood$ | -275.23 |

## Ⅴ. Concluding Remark

The leniency program has been considered as one of the most powerful means of detecting and dismantling cartels. Korea is one of the first countries in Asia that adopted the leniency program. However, its introduction in 1997 hadn't achieved its objectives until the significant amendments in 2005. Since then, the number

of the detected cartels dramatically increased. Many experts and the KFTC itself attribute its success in the detection of cartels to the leniency program. However, at the same time, criticism on the leniency program, especially on the full exemption of fines, has been growing. Once the former chairman of the Korea Fair Trade Commission, Ohseung Kwon, commented, "…When the leniency is applied, it creates cultural conflicts. People blame the KFTC. People think that the KFTC thinks the better of who cheated (applied for the leniency program), but takes a dim view of who cooperated (formed a cartel)…" Many people criticize the possibility that firms who once enjoyed high cartel profits are able to be exempt from fines, which is at the heart of controversy.

However, while there have been pros and cons for the current system of the corporate leniency program in Korea, little empirical research has been attempted. It comes from data unavailability. First, collecting useful data based on the decision reports or other sources is quite time consuming and subjective. Second, and the most important, the population of cartels are not observed. We observe only detected cartels, which rises to the sample selection program.

In this study, we use newly collected data on the detected cartels based on the KFTC's decision reports. The data set includes 521 cases of cartels, which covers most of the population of the detected cartels. Among those detected cases, we restrict our focus on the cases with fines imposed. With using this new data set from 1997 to 2010, we investigate the impact of the amended leniency program in Korea. We do not make an inference on the population of cartels, but make an inference on the population of the detected cartels. This make us free from the sample selection bias usually born by cartel related empirical research.

We find that the amended corporate leniency program induced

more information revelation to the cases where the leniency was applied and led to higher level of fines before the leniency and other discounts are deducted. However, there was no impact of the deduction applied fines, which implies the possibility that the leniency discounts are so large that they cancel out the increase of fines. The amendments in the leniency program also shortened the duration of investigation overall although it still takes more time to investigate and make a decision on the leniency applied cases. This may be because the ones detected by the leniency program are more complicated that take more efforts and time of investigating, filing documents and making a decision. However, at least, even for those leniency applied cases, the duration became shorter after 2005. Moreover, in the short run, the duration of the detected cartels became longer. We also find that during our sample period, the longer cartels survive under the leniency program, the longer the duration of cartels. This indicates stable and strong ones survive and lengthen the duration of cartels. These results support the leniency program's cartel destabilizing effects.

This paper provides empirical evidence for the success of the amended corporate leniency program in Korea. However, this paper is only the first step towards more rigorous empirical analysis on the effectiveness of the leniency program. In order to provide some guidelines on how to improve the current system or give some answers for the on-going controversies on the system, further research is needed.

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# 한국의 자진신고자 감면제도에 대한 실증분석: 2005년 제도의 수정을 중심으로

**최 윤 정***

## 논문초록

1997년에서 2010년에 걸쳐 적발된 카르텔사건들을 중심으로, 2005년에 수정된 한국의 자진신고자 감면제도가 카르텔에 어떠한 영향을 주었는지에 대해 연구하였다. 실증분석을 통해서, 자진신고자 감면제도가 적용된 사건에 있어서는 유익한 정보가 제공되었으며, 조사기간의 단축을 가져왔음을 보였다. 또한, 단기적으로 카르텔 형성의 저지시키는 영향력을 행사했음을 보였다.

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