

Revised, May 7, 2014

Deterrence Effects of Korean Antitrust Enforcement on Producer Prices and Profit Margins*

Robert M. Feinberg, American University, Washington, DC
and Minsoo Park, Sungkyunkwan University and CERK

I. Introduction

Antitrust enforcement is by now well-established in Korea, yet there has been little study of its effectiveness. Connor (2008), however, notes that “the Korean FTC has the best record of anti-cartel enforcement in Asia” and Jeong and Masson (1990) found evidence of market structure impacts on industry performance in Korea. In this paper we examine several datasets to investigate whether antitrust enforcement in Korea, especially anti-cartel activity, has had desirable price-limiting impacts over the past couple of decades.

We focus on two types of improper concerted actions, price fixing and big rigging. These actions concerning price are the main types of violation among the cases as seen in Table 1. We use panel data methods which allow us the opportunity to compare the behavior of firms and industries subjected to antitrust investigation to others and to examine the responses of these firms and industries themselves following the cases.

*We acknowledge financial support from CERK, and thank XXX for excellent research assistance.

<Table 1> Correction by Type of violation in improper concerted act

Year	Price Fixing	Terms of Transaction	Production restriction	Allocation of region	Restriction of specification	Establishment of joint company	Interfering with business	Bid rigging	Total
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'81~'95	100	8	7	14	1	3	7	0	140
1996	27	1	0	3	0	2	3	0	36
1997	14	1	1	3	0	1	2	0	22
1998	33	0	0	2	0	0	2	0	37
1999	29	0	0	0	0	0	5	0	34
2000	37	3	2	2	0	3	0	0	47
2001	32	3	0	4	0	2	2	0	43
2002	31	2	1	5	1	5	2	0	47
2003	16	2	1	1	0	0	3	0	23
2004	28	1	1	1	1	1	2	0	35
2005	38	0	0	5	0	2	1	0	46
2006	37	0	2	1	1	2	2	0	45
2007	33	1	1	4	0	0	5	0	44
2008	52	0	0	7	0	3	3	0	65
2009	29	3	1	4	0	2	1	21	61
2010	23	0	1	3	0	2	3	30	62
2011	27	4	0	3	0	1	2	34	71
2012	17	0	3	0	0	3	2	16	41
2013	18	1	4	3	0	1	3	16	46
Total	621	30	25	65	4	33	50	117	945
Ratio	65.7%	3.2%	2.6%	6.9%	0.4%	3.5%	5.3%	12.4%	100%

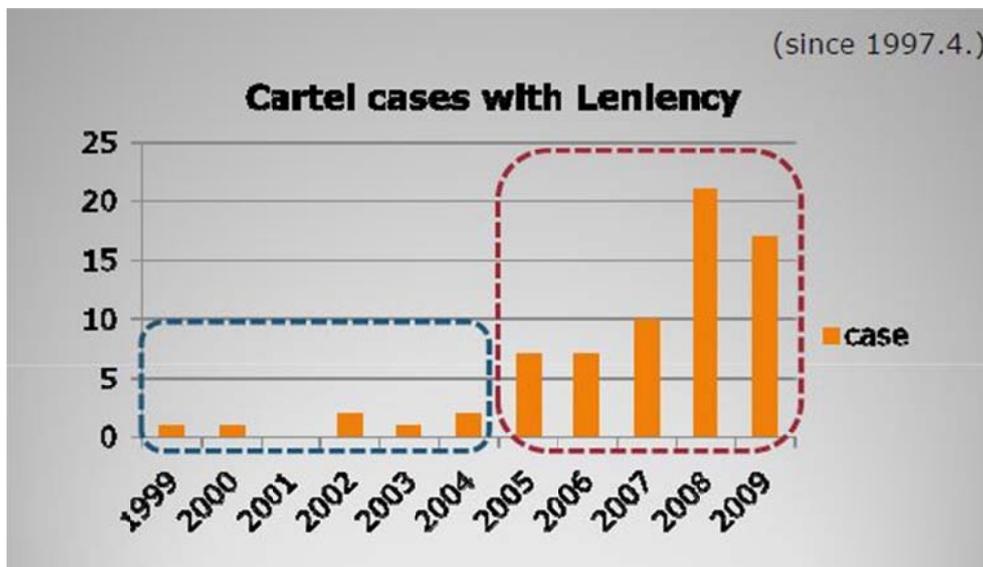
II. A Brief History of Antitrust Enforcement in Korea

Korean antitrust law (the Monopoly Regulation and Fair Trade Act or in short “Fair Trade Act”) was enacted in 1981 and the Fair Trade Commission (KFTC) was established in conformity with the law. At first the KFTC was a part of the Economic Planning Board (EPB), But soon the KFTC became an independent central administrative organization separate from the EPB. The KFTC consists of 9 commissioners, who deliberate and make decisions on competition and consumer protection issues. KFTC's case proceedings involve 2 stages: examination and deliberation. When possible violation of the law is reported or alleged, the relevant bureau or regional office launches an examination. If an examiner decides legal measures are required,

he/she makes an examination report and presents it to the Commission. After reviewing the report of the examiner and the opinion/report of the examinee, the Commission makes a final decision as to whether any laws have been violated. If a violation is duly recognized, the KFTC will impose corrective measures such as surcharges or a cease and desist order while referring some cases to the prosecution. If the examinees are not satisfied with the verdict of the committee, then they can bring the case to court (for more information about the KFTC, visit <http://eng.ftc.go.kr/>).

The history of antitrust law is short since Korea had experienced a “state-led economy” for a long time. A rule about cartels was introduced on December 31, 1986 and there was a first case of cartel fines in 1988. Two important amendments of the Fair Trade Act were made in April 2007 with effect from July 14, 2007. First, auction and bid rigging practices became a type of cartel under the Act. Second, the leniency program is introduced to encourage cartel members to inform on their cohorts. The Act allows the KFTC to reduce surcharge penalties on such informers. When it was introduced, the rate of leniency for the first informant was 75%. After the maximum leniency increased to 100% in 2005, the cartel cases with leniency have been growing, as can be seen in Figure 1.

<Figure 1> Number of cartel cases with Leniency



Source: http://eng.ftc.go.kr/files/static/Quick_Link/Leniency%20Program%20of%20Korea.pdf

III. Previous Literature

Before addressing the literature on effects of antitrust enforcement, first consider the mechanisms by which this enforcement can influence company pricing behavior. One – a *regime effect* – reflects a changed perception by all firms in an economy of the increased probability of detection and conviction and/or the financial sanctions likely to be faced if convicted of antitrust violations. This effect, which could be due to legislative action or significant changes in case-filing and sentencing activity, would likely lead to lower prices across the board; Feinberg (1980) and Block et al. (1981) present simple models demonstrating this effect.

In terms of purely case-specific effects we can identify both *strategic* and *deterrent* effects. A strategic effect could be seen as a cartel response to an ongoing investigation aimed at

either reducing the likelihood of a case being filed or the financial damages resulting; it also could be viewed – in the current regime of amnesty/leniency programs – as price-reductions occurring due to cartel members defecting leading to a case filing (hence a possible reverse causality here – with cartel collapse leading both to a price decline and a case being filed).¹ Deterrent effects of a specific case on pricing of the firms involved are only likely if an existing case outcome raises the chance of future cartel detection by the authorities (or weakens potential cartel members’ incentives to participate) or increases the sanctions faced if detected/convicted.

A variety of approaches have been used to examine the effects of antitrust (often simply called “competition policy”).² Survey approaches by Beckenstein and Gabel (1982) – of American antitrust lawyers, Feinberg (1985) – of EU antitrust lawyers, Gordon and Squires (2008) – of UK competition lawyers and companies, and Hulschelrath et al. (2011) – of Swiss antitrust lawyers and firms affected by enforcement, have found support for the view that deterrence can be achieved, especially if sanctions are increased.

Research on US, European and German antitrust has found some evidence of deterrence effects of price-fixing investigations, with effects declining over time. Feinberg (1980) presented a simple theoretical model suggesting that past enforcement for a firm or in an industry would lead to subsequent pricing effects, assuming that higher prices bring more antitrust scrutiny and that past antitrust cases increase the likelihood of high prices being confronted by a

¹ There has been some theoretical research suggesting a possible perverse impact of leniency/amnesty programs which may enhance the credibility of punishment threats and therefore help to strengthen a cartel.

² We focus here on studies of effects on firm behavior and performance. Van Sinderen and Kemp (2008) simulate impacts of Dutch competition policy on consumer surplus, but also examine impacts on economy-wide production and employment. Others have examined broader societal implications of antitrust regimes – see, for example, Petersen (2013).

new antitrust case; in a cross-section of 288 US firms, regression analysis finds that past cases lead to a lower Lerner Index $[(p-mc)/p]$. Feinberg (1986) examined effects of both German and EU antitrust cases on both producer price indexes and profit margins in that country – evidence is found of relatively short-term deterrence effects but little long-term impact. Sproul (1993), however, found no significant impact of U.S. antitrust enforcement on subsequent prices.

In studies of a particular industry, Block et al. (1981) found evidence of negative impacts on markups above cost in the US white bread industry of increased antitrust enforcement resources, while Feinberg (1984) looks at producer price index movements in 5 industries subject to US Antitrust investigations, finding significant price reductions due to the case filings in 4 of these. Clarke and Evenett (2003) studied the effects of global differences in antitrust regimes on import values during the international vitamin cartel of the 1990s, finding evidence of greater consumer harm in countries with weaker antitrust enforcement measures. Similarly, Sabbatini (2008) looks at impacts of Italian Competition Authority involvement in the baby formula and fresh milk markets during the 2000s, finding a mixed pattern of price effects.

In several papers, Connor (2004, 2006, 2008) has found evidence of significant financial sanctions imposed by the US and foreign antitrust authorities, but the limited degree to which these offset cartel overcharges. He argues that the deterrence effect of these sanctions will be limited unless fines are increased as a share of affected commerce and the overcharges themselves. However in his work, as in much of the empirical literature on antitrust deterrence, what is actually examined is the magnitudes of fines (and sometimes jail sentences) and civil damages imposed – assuming (possibly correctly) that increasing penalties will translate into

more deterrence; but, it has also been suggested that probability of detection and conviction and not magnitude of penalties is what will deter cartel activity the most. At best, however, this is quite an indirect approach to deterrence, and what seems preferable (though often more difficult due to data limitations) is the more direct look at cartel occurrence or price effects due to antitrust enforcement.

Bergman (2008) discusses a variety of methodologies which have been used recently in assessing competition policies, noting a small number of econometric studies of price effects of mergers and a larger number of such studies of cartel effects on prices, but little in the way of econometric analysis of competition authority *anti-cartel* impacts. Connor (2007) exhaustively surveys these studies of cartel price effects, finding a median of 770 average price effects estimated in the studies to be 25%. Werden (2008) finds this number to be somewhat high and takes as a more reasonable figure a 10% price effect for US criminal cartel prosecutions. But, again, these are estimates of the effects of the cartels detected – whether the antitrust case reversed entirely the price effects on consumers is merely assumed, not shown. Clearly though, quantifying the magnitude of consumer gain from anticartel efforts -- though most likely substantial – is quite difficult.

Two types of deterrence studies can be conducted – looking only at firms/products involved and testing for impacts; the other is looking across all firms/products and testing for differences between the two groups – in this study we attempt to do both. This allows us both to compare investigated companies and industries with others and to observe effects over time within those investigated.

IV. Methodology

Given that the first anti-cartel fines in Korea were issued only in the late 1980s, it would not be expected that deterrence would be observed for at least several years beyond that. We start our analysis in 1990 (through 2013), and undertake two closely-related reduced-form econometric studies. First, we explain the impact of antitrust enforcement on producer prices in a pooled sample of up to 884 product and service categories for the years 1990 through 2013. Second, a firm-level study will be conducted explaining profit-margins and return on investment; in this study, we attempt to distinguish the effects of antitrust cases against others in the industry from effects against the firm in question. For the first study, the regression specification is a panel data model:

$$\ln PPI_{it} = a_i + b_i \ln RGDP_t + c_i \ln INF_t + dATR_{-1} + eATR_{-2-5} + fATR_{-6-10} \quad (1)$$

where PPI_{it} is the producer price index for product i in year t (indexed at 2010=100) and explanatory variables are macroeconomic variables (an economy-wide price deflator and real GDP) to capture cost and demand pressures, as in Feinberg (1986) -- INF_t and $RGDP_t$ -- plus a series of dummy variables representing lagged (both to allow for time for pricing decisions to be made and to deal with possible endogeneity of a case filing) antitrust case filings (one year, two-to-five year, and six-to-ten year lagged), ATR_{-1} , ATR_{-2-5} , and ATR_{-6-10} . We allow product-specific fixed effects (which should capture market structure and other product-heterogeneity issues) as well as product-specific responses to cost and demand movements.

The firm-level study explaining profit-margins and return on investment will allow us to incorporate both firm and industry-specific antitrust measures to study whether deterrence is

achieved by “demonstration” or “neighboring” effects of cases against others in the same industry. Two specifications are used to test the deterrence effects on firm profitability.

The first includes short, medium, and long-run “direct effects” (ATR_{-1} , ATR_{-2-5} , and ATR_{-6-10}) all together as well as “neighboring effects” on the other firms in the same industry ($NEIATR_{-1}$, $NEIATR_{-2-5}$, $NEIATR_{-6-10}$):

$$\begin{aligned} \text{Profitability}_{it} = & a_i + bX_{it} + cATR_{-1} + dATR_{-2-5} + eATR_{-6-10} \\ & + fNEIATR_{-1} + gNEIATR_{-2-5} + hNEIATR_{-6-10} \quad (2) \end{aligned}$$

where X_{it} includes total assets as a share of sales (TA), advertisement expenditures relative to sales (AD), market share (MS), firm size (SIZE), firm age (AGE). The NEIATR variables are dummy variables that take on a value of 1 if a firm has not been convicted for cartel activities but belongs to an industry where there has been any cartel case in the time period considered. Market share is calculated as a share of sales in the industry level not in the product level. The variable SIZE takes 1 if a firm is classified as a large firm in terms of the number of employees (more than 300).

The second approach is the so-called “pulse effects” difference-in-difference model. The periods of event vary across firms and the effects vanish after some periods (so it looks like pulse).³ The short, medium, and long-run effects are separately estimated and a variable indicating the industry with cases (INDATR) as follows:

$$\text{Profitability}_{it} = a_i + bX_{it} + cATR_{-1} + dINDATR_{-1} \quad (3)$$

³ See for example Jensen (2007); Gruber and Hungerman (2008).

The industry –level case dummy INDATR has a value of one if any firm in an industry has experienced anti-cartel actions in a given period, zero otherwise. A firm which was convicted for cartel has one for both ATR and INDATR while the other firms in the same industry has zero for ATR and one for INDATR. In equations (2) and (3), year and firm dummies are also included. The sum of coefficients c and d is the direct effect (to the convicted firm) while d is the neighboring effect compared to the firms belonging to the industries where no firm has been convicted.

V. Data

1. Anti-cartel case records

We collected and compiled anti-cartel cases obtained from the KFTC. There are 305 cases where 1857 firms are involved (some of the firms are investigated more than once and double-counted). The KFTC documents provide other details about the case such as duration of collusion, residence, amount of fine (which we may make use of in future extensions of this research).

2. PPI and macroeconomic variables

The Bank of Korea compiles a monthly producer price index series which covers 884 items, comprising 801 products and 83 services. In the regression we used the PPI in 288 more-aggregate categories since some of the collusion cases covered two or more items and the share

of products with no involvement in cartel cases is too large in the detailed item-level classification.

Two alternate measures, real GDP (RGDP) and the index of industrial production (IP), are used to represent the overall state of the economy. Real GDP covers the entire period of PPI data but it is only available quarterly. Industry production index is provided monthly but only from 2000, therefore we have tried both measures. Inflation (INF) is the rate of change in consumer prices which are compiled by Statistics Korea, the national statistics agency.

3. Firm profitability

Financial statements of the firms are obtained from KIS (Korea Information Service) which collects and provides information about companies listed on the Korean Stock Exchange and registered on the KOSDAQ market. Of course, returns calculated from accounting data are different from economic profits. For robustness we tried three measures of firm profitability. Gross profit margin (GPROFIT) is calculated as $(\text{sales} - \text{cost of sales})/\text{sales}$. If we assume constant marginal costs or use average variable costs as a proxy for marginal costs, then GPROFIT can be similar to the price-cost margin (or Lerner Index) since $\text{sales} = P * Q$ and $\text{cost of sales} = c * Q$.

Operating profit margin (OPROFIT), which is the ratio of operating income to sales, and return on assets (ROA), which is the ratio of operating income to total assets, are the other two measures. The firm level financial data is matched with anti-cartel case records and firm- and industry-level incidence of antitrust cases are constructed. Control variables which may affect

the rate of returns are the total assets to sales ratio (TA), advertising expenditure to sales ratio (AD), and market share (MS).

VI. Estimation Results

We first estimate equation (1) for the entire sample period (1989 to 2013) (using RGDP as the overall demand proxy) and for the 2000 to 2013 period for which monthly IP data are available.⁴ For both we report results with random product effects, first restricting macroeconomic effects on product prices to be constant across industries and then allowing them to be industry-specific. These are shown in Tables 2 and 3. In columns (1) and (2) of Table 2 we see no significant impact of antitrust cases on product prices over the full time period, but a 6.3 percent price reduction in the year after a case, when the sample starts in 2000 (a period in which antitrust enforcement has become increasingly stringent in Korea). In Table 3, allowing product-varying impacts of RGDP (and IP) and INF the results are quite similar: weak results for the full time period (column (1), but a significant one-year effect (here about 3.4%) since 2000, in column (2)).⁵

Turning now to the firm-level regressions, Table 4 presents results for both equations (2) and (3) explaining return on assets – restricting the analysis with firms above \$100,000 in sales.⁶ Of the control variables, we see that higher market shares translate into larger ROA while more advertising-intensive firms have lower ROA (the latter result may be related to consumer vs. producer good differences in profitability). Consistent with the PPI results, we find a short-run

⁴ For this latter period results are quite similar whether RGDP or IP are included; we report the results with IP.

⁵ The 288 product-varying coefficients of each of INF and the demand proxies are not reported here.

⁶ The antitrust effects are somewhat larger when all firms are included, suggesting that very small firms may be particularly concerned with antitrust investigations affecting them and others in their industry.

negative impact of antitrust cases affecting the particular firm and (somewhat smaller) a short-run negative “neighbor” effect as well.

Table 5 presents comparable results for the gross profit margin. Again we find a short-term firm-specific negative impact of antitrust, though a surprising positive “neighbor” effect. In results not reported here, we fail to find significant effects of antitrust on operating profit margins.

VI. Conclusion

While these results are still somewhat preliminary, they are consistent with previous work suggesting that long-term deterrence is unlikely to be observed from antitrust investigations, though short-term price (and possibly profit margin) impacts may be expected. They are also consistent with the view that the major impact of careful enforcement of anticartel policy may be an economy-wide regime effect of lower prices resulting from a more competitive environment; however, these regime effects are difficult to document.

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Table 2. Dependent variable is lnPPI (impacts of RGDP, IP, and INF constant across products)

VARIABLES	(1) rgdp RE	(2) ip RE
lnRGDP	-0.047 (0.050)	
lnINF	1.012*** (0.090)	1.040*** (0.077)
ATR1	-0.042 (0.033)	-0.063** (0.026)
ATR2_5	0.027 (0.041)	-0.025 (0.030)
ATR6_10	0.048 (0.049)	-0.001 (0.040)
lnIP		-0.016 (0.071)
Constant	0.510 (0.609)	-0.114 (0.422)
Observations	76,308	45,456
Number of gid	288	288

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3. Dependent variable is lnPPI (product-varying impacts of RGDP, IP, and INF)

VARIABLES	(1) rgdp inter RE	(2) ip inter RE
ATR1	-0.00847 (0.0146)	-0.0339** (0.0167)
ATR2_5	0.0459* (0.0269)	-0.0130 (0.0189)
ATR6_10	0.0435* (0.0225)	-0.0249 (0.0248)
Constant	0.870 (0.576)	-0.121 (0.421)
Observations	76,308	45,456
Number of gid	288	288

Robust standard errors in parentheses. Not reported are product-varying effects of RGDP, IP and INF

*** p<0.01, ** p<0.05, * p<0.1

Table 4. Dependent variable is ROA (only firms with over \$100,000 in sales)

VARIABLES	(1) ROA	(2) ROA	(3) ROA	(4) ROA
ATR1	-0.00838* (0.00430)	-0.00474 (0.00443)		
ATR2_5	-0.000356 (0.00303)		-0.00147 (0.00308)	
ATR6_10	0.000354 (0.00407)			-0.00217 (0.00406)
NEIATR1	-0.00310* (0.00160)			
NEIATR2_5	0.00182 (0.00144)			
NEIATR6_10	0.00348*** (0.00127)			
AD	-0.119*** (0.0300)	-0.119*** (0.0300)	-0.119*** (0.0300)	-0.119*** (0.0300)
MS	0.148*** (0.00530)	0.149*** (0.00526)	0.148*** (0.00528)	0.148*** (0.00526)
SIZE	4.97e-05 (0.0122)	-2.16e-06 (0.0122)	0.000115 (0.0122)	0.000112 (0.0122)
AGE	0.000382 (0.00114)	0.000401 (0.00114)	0.000416 (0.00114)	0.000410 (0.00114)
INDATR1		-0.00337** (0.00164)		
INDATR2_5			0.00169 (0.00149)	
INDATR6_10				0.00320** (0.00131)
Constant	0.0576*** (0.00598)	0.0574*** (0.00598)	0.0577*** (0.00599)	0.0578*** (0.00599)
Observations	654039	654039	654039	654039
R-squared	0.590	0.590	0.590	0.590

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 5. Dependent variable is Gross Profit Margin (only firms with over \$100,000 in sales)

VARIABLES	(1) GPROFIT	(2) GPROFIT	(3) GPROFIT	(4) GPROFIT
ATR1	-0.00772* (0.00417)	-0.0102** (0.00420)		
ATR2_5	0.00115 (0.00399)		-0.00901* (0.00537)	
ATR6_10	-0.00248 (0.00486)			0.00923 (0.00879)
NEIATR1	0.00361** (0.00171)			
NEIATR2_5	0.00977* (0.00563)			
NEIATR6_10	-0.00876 (0.00762)			
TA	-0.00157 (0.00173)	-0.00157 (0.00173)	-0.00157 (0.00173)	-0.00157 (0.00173)
AD	-0.748 (0.620)	-0.748 (0.620)	-0.748 (0.620)	-0.748 (0.620)
MS	-0.00704 (0.0207)	-0.00661 (0.0208)	-0.00852 (0.0218)	-0.00465 (0.0196)
SIZE	-0.00359 (0.0176)	-0.00368 (0.0176)	-0.00365 (0.0176)	-0.00375 (0.0176)
AGE	0.00125 (0.00272)	0.00121 (0.00273)	0.00118 (0.00271)	0.00124 (0.00273)
INDATR1		0.00248* (0.00133)		
INDATR2_5			0.0104 (0.00635)	
INDATR6_10				-0.0104 (0.00852)
Constant	0.250*** (0.0188)	0.250*** (0.0187)	0.250*** (0.0189)	0.249*** (0.0185)
Observations	590745	590745	590745	590745
R-squared	0.306	0.306	0.306	0.306

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1