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HIGHER SCHOOL OF ECONOMICS

*Gyuzel Yusupova*

# LENIENCY PROGRAM AND CARTEL DETERRENCE IN RUSSIA: EFFECTS ASSESSMENT

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*Gyuzel Yusupova*[1]

# LENIENCY PROGRAM AND CARTEL DETERRENCE IN RUSSIA: EFFECTS ASSESSMENT [2]

The empirical assessment of leniency program (LP) in Russia shows the effects of changes in the rules on the behavior of market participants. In this paper we test hypotheses about LP enforcement against the characteristics of cartels: their subject, duration and the number of participants. We show that LP in Russia makes enforcement of the behavior of market participants less effective and accordingly reduces cartel discoveries. However the reforms of Program in 2009 give some positive results.

JEL Classification: K2, K21

Key words: Leniency Program, Collusion, Antitrust legislation

[1] National Research University Higher School of Economics, Institute of Industrial and Market Studies, associate professor, email: GYusupova@hse.ru

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# Introduction

During the last twenty years leniency program (LP) has become the subject theoretical research which shows how the models developed in the literature can be used to estimate their effect. A separate line of academic research is the empirical assessment of results of the application of LP. Such research has been conducted by foreign economist-researchers using specially created databases. There are still many questions connected with LP, not only in Russia, but also in the international research. In particular, how the market characteristics and national antitrust legislation influence in effects of LP.

The literature on LP in antimonopoly policy discusses the advantages and disadvantages of repentance. LP has been introduced in many countries over the last thirty-five years, with differing results. LP has a long history in the US, the first Corporate Leniency Program was introduced in 1978. It was then improved and extended in August 1993 and making it more attractive for companies to cooperate with US Antitrust Division. The research which measures the effects of LP on the duration of cartel agreements concluded that from 1990-2004 the introduction of the program considerably reduced cartel duration (see, for example, Zimmerman & Connor [2005]).

In Europe the first LP was introduced in 1996. A modified LP introduced by the EC in 2002 gave complete immunity from fines to firms which were the first to submit evidence of a cartel to the antitrust authorities. Similar programs were introduced in 2002 in the UK and other European countries. An analysis of the effects of these LP showed that there are fewer cartel agreements (see, for example, Motchenkova [2004]).

Research into LP effects is needed in countries, such as Russia, without settled traditions of law enforcement, with a young Antitrust Authority, and where courts and national companies are unused to antitrust requirements. LP was first introduced in Russia in 2007, but after two years it was reformed as the initial version did not fulfill the criteria of an effective program and did not provide the necessary incentives for market participants (see, for example, Shastitko & Avdasheva [2011]). According to the 2007 Federal law № 45-FL "About modification of the Administrative Offences Code of the Russian Federation" there are conditions which will be granted an immunity for cartel violations.

In a note to article 14.32 of the "Administrative Offences Code of the Russian Federation": for a person who has voluntary informed the antimonopoly authority about cartel

agreements or concerted practice there is full immunity since the summer of 2009. Other infringers may have fines imposed, and since the end of October 2009, criminal liability.

The introduction of LP seeks, without increasing the financing of antimonopoly authorities activities, to convince market participants not to enter into cartel agreements and to increase the number of cartel disclosures. LP can only be effectively implemented when they are complemented by other mechanisms and instruments of antimonopoly policies.

The assessments of LP effectiveness in Russia are very different. There were only about 20 annual statements within the program after reform of 2009. However, the main evidence of LP effectiveness should be the decrease in number of illegal collusions but not number of statements.

The purpose of this research is the empirical assessment of LP as an instrument to prevent cartel agreements in Russia. The results will help to interpret with caution the impact of LP on cartel agreements.

## LENIENCY PROGRAM EFFECTS: LITERATURE SURVEY

- THE THEORY ABOUT THE IMPACT OF LP ON THE RESTRAINT AND PREVENTION OF COLLUSION

The academic development about the enforcement of LP is the perspective direction of empirical researches around the world. The empirical assessment of LP effects within the framework of institutional researches in Russia allows to show the influence of rules change on the behavior of market participants.

Two directions for the assessment of LP effects are provided by Motta and Polo (see, for example, Motta & Polo [2003]) and Aubert and coauthors (see, for example, Aubert et al., [2006]).

In the work of Motta and Polo the optimal policy of an antimonopoly authority is analyzed in the conditions of alternative rules in relation to various types of agreements. It describes the positive impact on antimonopoly policy by the use of reduced penalties. The main effect of LP under this approach is to reduce the expenditure of antimonopoly authorities.

Aubert and his colleagues show a mechanism of incentives for companies to refuse to participate in cartels. A similar approach shows, for example, how in the case of the initial value of the discount factor, LP implemented by the antimonopoly authorities limits the value of participating in cartels (see also Fraas & Greer [1977]).

These two theories correspond to the empirical works devoted to the assessment of the effects of LP both for markets, and for activities of antimonopoly authorities. The research described in this article follows the work of Aubert and his colleagues and studies the impact of LP on markets, not on antimonopoly authorities.

- EMPIRICAL RESEARCH ON LENIENCY PROGRAM EFFECTS

A separate direction of academic research is the empirical assessment of the results of the implementation of LP. Examples of research on the basis of specially created databases are the works of Miller (2009), Marvao (2010), and Klein (2010) for the European Union.

A distinction in the approaches of the assessment of LP can be illustrated by a comparison of the methods of Miller (2009) and Klein (2010). By using U.S. Department of Justice data from 1985 to 2005 Miller tests the dependence of cartel discoveries on the introduction of LP, on cycle phase (measured by the change in gross domestic product), on the antimonopoly authority budget and on the amount of penalties imposed for the previous fiscal year. In the Poisson regression a variable is included which describes the time from the introduction of the LP. In various specifications it was shown that LP have a significant influence on the increase of the number of cartel discoveries.

Klein used the indicator "share of profit in the price" as an indicator of competition intensity as a dependent variable, broken down by EU types of activities, and as independent variables indicators of separate tools of economic policy (including LP) and structural characteristics of activity were used. The profitability reduction in highly concentrated markets is interpreted as meaning it is possible to give up on cartel agreements because of LP. However a drawback of this analysis is the complexity of interpreting the "share of profit in the price". This problem has been widely studied in modern empirical market research, and a high "share of profit in the price" shows the role of non-price competition in the market, and low costs (for example, from accounting policies). The correlation this indicator with competition and its restrictions is not obvious.

Marvao (2010) studied a model of LP in the EU where the first informant escaped punishment. Her paper answers the question: what can a firm expect when reporting to the antitrust authority , in terms of percentage fine reduction under LP? The author first studies a possibility of LP' use and penalty reduction. She then did a regression analysis of the quantitative decrease in penalties. The analysis confirmed two results. First, that the first reporter receives much higher fine reductions, independent of whether or not the reporting of the cartel took place before or after the Commission started an investigation. Second, the introduction of LP decreases the length of the investigation. This is because a substantial amount of information

is given to the EC by the reporting member(s), decreasing the cost of prosecution. This work confirmed the conclusions of the model by Motto and Polo.

At the same time there are still many questions connected with LP in Russian and elsewhere. In particular, how features of markets work where LP are in effect and how the features of national antitrust legislation influence LP efficiency (see, for example, Avdashev & Simankova [2009]).

The answers to these questions are important for the improvement of LP in Russia. The relevance of the LP efficacy with the diversification of the activities of the Federal Antimonopoly Service (FAS) in Russia is that LP decrease the cost of prosecution because of the information reported by cartel members.

## THE APPLICATION OF ANTITRUST LEGISLATION AGAINST CARTELS IN RUSSIA

There have been many changes in the scope of the Antitrust legislation in Russia since 2006 when a new Law "On the Protection of Competition" was adopted, including criminal liability for the restriction of competition, and an increase in FAS activity. According to the efficiency rating results competitive departments published by the Global Competition Review, the FAS is one of the largest in the world although there was a slight decrease in the number of cases connected with antitrust law enforcement in 2012 (397 cases) against (497 cases) in 2011, according to statistics from the Supreme Arbitration Court of the Russian Federation.[3] Though Global Competition Review and some experts (see, for example, Avdasheva & Shastitko [2011]) note that FAS opens many cases. Moreover in 2012 in comparison with 2011 FAS contested more cases and there were more cases which met the requirements for legal action. However there is a lot of criticism that Russian antitrust authorities make insufficient use of economic analysis and make many mistakes (see, for example, Girgenson & Numerova [2012] and Avdasheva & Shastitko [2011]).

Proceedings against cartels remain rare. Generally collusions are pursued on the grounds of collective dominance (see, for example, Avdasheva, Goreyko & Pittman [2012]) or concerted practice. "On the Protection of Competition" describes illegal horizontal agreements which are described in the part 1 of article 11: The concerted practice of economic entities is prohibited, if such practice leads or can lead to:

1) fixing or maintaining prices, tariffs, discounts, markups, surcharges and/or additions to prices;

[3] The information about cases where antimonopoly authorities took part and studied by Arbitration Court of Russian Federation in 2011 - 2012 .

2) increasing, reducing or maintaining prices in course of competitive bidding;

3) dividing the goods market according to a geographic principle, the quantity of sales or the purchase of goods, the mix of goods or a composition of buyers or sellers;

4) reducing or terminating the production of goods; or

5) refusing to conclude contracts with particular sellers or buyers.

In this paper only classic horizontal agreements are studied. So for the assessment of LP effects in Russia and for the opportunity to compare them, with similar programs in other countries only those explicit collusions which are illegal according to the Russian antitrust legislation and would be illegal in foreign markets were chosen. It is necessary to distinguish classic cartel agreements from concerted practice and other types of agreements which can restrict competition. The European Commission concentrates on horizontal agreements with price-fixing, market sharing, bid-rigging and tender fixing, export cartels, marketing and advertising agreements, agreements on standards, and exchange of information. These are the types of agreements that would be considered as horizontal "concerted practices" in the EU, and so, can be subject to leniency guidelines.
The antimonopoly authority of Russia identified 300-500 horizontal agreements for the period 2004-2011 under the article 11 of Federal Law "On the Protection of Competition", and very few classic cartels were found.

## DATA AND SAMPLE INFORMATION

The database is created using market characteristics. This corresponds with tradition of Abert et al. (2006) who studied directly or indirectly the impact of LP on markets, but not on antimonopoly authorities. The structure of the database includes 4 criteria which are used to select cartel agreements. These are "the characteristics of the cartel agreement", "antitrust policies", "facilitating and self-enforcing techniques", and "market characteristics".

"The characteristics of the cartel agreement" includes the type of agreement, the number of participants, the market, the nature of the infringement (price fixing, market sharing, bid rigging), start and end time of the cartel. The end of the cartel agreement can depend on the FAS, the courts, or the participants themselves.

"Antitrust policies" is necessary for LP effect assessment and sanctions. In the analysis of cartel agreements the end of collusion according with to the introduced changes in the LP enforcement is considered, namely whether the cartel ended before April 2007, after July 2009, or between these dates. At the same time cartel agreements can be detected independently by FAS and therefore regardless of LP. Sanctions are the primary instrument in the prevention of

antitrust violations. The fact is that in Russia the decision about the imposing of fine is made separately from the decision about conviction of company. At first the company must be found convict, and then FAS separately makes the decision about penalty. However if the company brings such decision about guilt into challenge, so the decision procedurally about penalty is blocked. Until the company is challenging the FAS decision, it isn't worth to make the decision about administrative penalty. Therefore the decision about penalty can be different in time (months, even years) from the main decision. Besides, FAS can make a decision not to impose penalties. Other moment which also should take into account in the analysis of cartel, is the old cases (relating to the period before 2007). The fact is the turnover-based fines were not excised in the period before 2007). So our database consists of cartel agreements which were not imposed by penalties according to the FAS decision, and also the cartel agreements which did not have the FAS decisions yet.

"Facilitating and self-enforcing techniques" is devoted to the sustainability of a cartel. Members often devise multipronged mechanisms to monitor one another to detect and punish cheating. Self-enforcing techniques include threats, information exchange, compensation schemes between cartel members, and price-leader or quantity-leader.

"Market characteristics" includes the market type (national, regional, local), market concentration, and the type of goods (final product, intermediate product or service).

Cartel agreements took place in a range of markets for example, chemical products (caustic soda, cable plastics, liquid chlorine, industrial explosives), primary commodity markets (coal, gas), alcohol, food salt, financial services, and transport services. The markets of food salt, caustic soda, aluminum alloys are considered highly concentrated; the match market has middle concentration; the markets of financial services and industrial explosives have a low concentration.

Highly concentrated markets create restrictions for new participants. All things being equal, the higher the concentration, the more collusion is expected because of increased benefits. High concentration facilitates the coordination of market behavior and makes the enforcement of the collusion easier and more effective. It is also easier for participants to track and punish those who deviate from the cartel agreement.

Over the period of 2004 - 2011 only 30 cases of classic horizontal agreements were studied by FAS.[4] This was compensated by the initiation of proceedings about concerted practice. The definition of concerted practice in Russian law is very close to that of tacit collusion with Nash equilibrium in the Bertrand model with infinitely repeating interaction. Such an understanding of concerted practice complicates the search for evidence, and means decisions have to me made

[4] http://www.fas.gov.ru/

with minimal evidence. “On the Protection of Competition” restricted the collection of statistics of cases based on the law “On Competition and the Restriction of Monopolistic Activities in the Goods Market”.

For this research I take the horizontal agreements such as price-fixing, market sharing, bid-rigging and tender fixing over the period of 2004-2011. Detailed information is in table 1 of Appendix 1.

Penalties on participants of cartels have remained modest in comparison with the penalties that have been set by the European Commission and Antimonopoly Authority of the USA. In the USA for the period of 1997-2003 there were 40 cases in which the penalties exceeded 10 million US dollars. During the period of 1990-2009 the Antimonopoly Authorities of the USA and EU imposed penalties of 25.3 trillion US dollars on 1200 companies for price fixing (Connor & Miller [2013]). In Russia the highest penalty since 2008 has been 23130,00 million euro (or US dollars 32238.00) which was imposed in 2012. But the number of classic cartel agreements was very small (only 30 cases) from 2004 till 2011, the total amount for such violation was very modest, 58517, 3 million dollars US.

Most infringements described in Appendix 1 were in the form of price fixing and market sharing. All the bid-rigging discoveries took place after 2008. It is connected with the fact that efforts to develop competition in these markets were undertaken (Yakovlev & Demidova [2012]).

Thus, there are doubts as to whether LP has an essential impact on cartel discoveries, and on the behavior of market participants.

## KEY HYPOTHESES AND METHODOLOGY

The main result confirmed the effect of LP is a decrease in the stability of cartels, illustrated by the break up of already existing cartels and the absence of incentives for new cartel agreements. The usage of additional indicators of the LP enforcement (the characteristics of agreements, the structure of markets where agreements are concluded, the enforcement mechanisms inside a cartel) also could confirmed the efficiency of LP (see also, for example, Fraas & Greer [1977] ).

Firms agreeing not to compete with one another is the most serious violation of competition law. They injure customers by raising prices and restricting supply, thus making goods and services unavailable to some purchasers and unnecessarily expensive for others. The categories of conduct considered most serious are: price fixing, output restrictions, market sharing, collusive tenders.

LP enforcement leads to a decrease in the number of cartels where cartels are less likely to occur. This was confirmed by Fraas and Greer (1977) who showed, first, the structural conditions most favorable to tacit cooperation are a relatively small number of rival firms and a market setting relatively free of complications. Second, a variety of regimental or disciplinary arrangements (for example, trade associations, single sales agencies) can facilitate tacit or explicit cooperation under more adverse structural conditions. Also they were the first to match these conditions with cartel stability.

This paper studies the effects of LP on cartel agreements, evidence of program effectiveness is:

(1) A decrease in number of participants of cartel discoveries;

(2) A decrease in number of cartels in the markets with low concentration;

(3) A decrease in cartel duration;

In the econometric analysis I use two variables as explained variables. One variable describes cartel duration *dur* in the market *i* for the period *t* expressed in months proven by documented evidence. The other variable describes a number of the participants *firms*. This variable is important because the number of cartel participants influences the incentives to support collusion.

The independent variables described in table 2, are divided into 4: agreement type, antimonopoly policy, market and industry characteristics, and actions of participants inside of cartel. All hypotheses for testing are described in this table also.

**Tab.2. Characteristic of independent variables**

| | **Variables** | |
|---|---|---|
| Dummy variables of "Characteristics of cartel agreement" | *Price-fixing agreements (PF)* | 1 if there is an agreement to undertake anticompetitive practice: price-fixing, increasing prices, setting a minimum price or discounts, or the fixing of quantitative quota, 0 otherwise; |
| | *Market sharing (MS)* | 1 if there is an agreement to undertake anticompetitive practice: dividing the market geographically, setting the quantity of sales or purchases of the goods, the mix of goods or a composition of customers, 0 otherwise; |
| | *Bid-rigging* (*BR*) | 1 if there is an agreement rig bids, 0 otherwise; |

*H1: When more competitors enter into anticompetitive practice (PF, MS, BR), then they get smaller*

*profits and such an agreement is not stable.*

| | | |
|---|---|---|
| Variables of «Antimonopoly policy» | *Leniency SR* **(***lpsr***)** | 0, if cartel ends before April 2007; 1 otherwise; |
| | *Leniency SR* 2 **(***lpsr2*) | 0, if cartel ends after April 2007 but before July 2009; 1 – if cartel ends after July 2009; |
| | *LeniencyLR* **(***lplr**)* | 0, if a cartel formed before leniency program introduces in Russia for the first time; 1 otherwise; |
| | *Fine* | Cartel fines per infringement, in rubles |

*H2: The tested hypothesis is that reform of Federal Law №45-ФЗ «About modification of Code of administrative offenses of the Russian Federation" about LP in 2007 year, and then in 2009 year affected duration of cartel agreements, the number of cartel members, and the cartel discoveries. Expected coefficients (lpsr), ( lplr**)** and (Fine) are negative. The incentives to maintain cartel agreement decrease with the increasing penalties.*

| | | |
|---|---|---|
| Dummy variables of «Market characteristics» | Wholesale & retail trade (*W&R*) | 1 if cartel formed in wholesale & retail trade markets, 0 – otherwise; |
| | Primary materials (*PM*) | 1 if cartel formed in primary material markets: milk, mineral coal, coal, 0 otherwise; |
| | Chemicals (*Chem*) | 1 if cartel formed in the chemical market (in this research, caustic soda, liquid chlorine, industrial explosives), 0 otherwise; |
| | Machinery, equipment and metal products (*MEMP)* | 1 if cartel formed in the markets for cover sheets and aluminum alloys, the production and sale of cash registers, and transport equipment, 0 otherwise; |
| | Transport services (*TR*) | 1 if cartel formed in the transport service market, 0 otherwise; |
| | Consumer electronics (*Celec*) | 1 if cartel formed in the consumer electronics market, 0 otherwise; |
| | Other products and services (*OPS)* | 1 if cartel formed in the markets of other products and services (security services, housing and utilities infrastructure, financial services, repair dredging work), 0 otherwise; |

*H3: The tested hypothesis is that the number of cartels decreases in industries with low*

*concentration.*

| | | |
|---|---|---|
| Dummy variables of «Facilitating and self-enforcing techniques» | Compensation (*COMP*) | 1 if members agreed on a compensation scheme; 0 otherwise; |
| | Threat (*TH*) | 1 if threat or coercion were used to induce participation in or compliance with an infringement; 0 otherwise; |
| | Information exchange (*INFEX*) | 1 if information on price, quantity, customers, capacity, or sales were exchanged for monitoring purpose; 0 otherwise; |
| | Retaliation (*RET)* | 1 if members agreed on retaliatory mechanisms; 0 otherwise.<br>Retaliatory mechanisms would mean that within the cartel there are some mechanisms that punish any deviations from the cartel agreement; |
| | Price leader *(PRL)* | 1 if a cartel member was a price or market leader; 0 otherwise |
| | Side arrangement *(SIDARR)* | 1 if members had side arrangements (e.g., joint investment, technology sharing, exchange of product); 0 otherwise.<br>If members of the cartel had any other cooperation, for example joint R&D projects in addition to the cartel agreement itself. |
| | Ringleader *(RINLEAD)* | 1 if the Federal of Antimonopoly Service identified a ringleader; 0 otherwise; |
| | Recidivism (*RECDIV)* | 0 if all members are first-time offenders; 1 if a member is recidivist; |

*H4: That the various mechanisms of cartel stability effectively discipline its participants.*

Taking into account the tested hypotheses the specification of regression model looks as follows:

$$E\left(dur_{it} \mid x_{it}^{/}\right) = x_{it}^{'}\beta \qquad (2)$$

The regression model Poisson's distribution is used to test the required dependence. In the Poisson model the probability of implementation $y_{it}$ of separate outcome $dur_{it}$ is modeled as follows:

$$\Pr\left(dur_{it} = y_{it} \mid x'_{it}\right) = \frac{\exp\left(-\lambda_{it}\right)\lambda_{it}^{y_{it}}}{y_{it}!}, \qquad (3)$$

with $\lambda_{it} = E\left(dur_{it} \mid x'_{it}\right) = \exp\left(x'_{it}, \beta\right)$. In spite of that, $E\left(dur_{it} \mid x'_{it}\right) = Var\left(dur_{it} \mid x'_{it}\right)$ (equidispersion) is a significant restriction of these models type, (see, for example, Verbeek [2000]). The parameters estimation received from the model per method of maximum likelihood are asymptotically normal. $x'_t$ is a row of model regressors , $\beta$ is a vector of parameters.

In this regression equation all factors of the model are regressors. Because of the small number of observations, I use a limited basic specification which include the main regressors. Also because of small number of observations the regressors were included by "clusters" depending on the tested hypothesis. In the analysis I use recurring regression, but not panel regression. All additional explaining variables are used to test the stability of the main results.

## REGRESSION RESULTS

Table 3 presents the Poisson regression results of the effects of LP on detection capability. In the regression, the dependent variable is the number of infringers *Firms*. Column 1 includes *Firms* and four variables of "Antimonopoly policy": *Leniency SR* (*lpsr*)**,** *Leniency SR* 2 (*lpsr2*), *LeniencyLR* (*lplr), Fine (logFine).*

**Tab. 3. The Poisson regression results for number of undertakings-infringers**

| firms | Coef | Std. Err | Robust Std. Err |
|---|---|---|---|
| logFine* | -0.0592422*** | 0.0074332 | 0.0181471 |
| lpsr | 1.400141* | 0.2039153 | 0.3332825 |
| lpsr2 | -0.2774817*** | 0.118085 | 0.2663924 |
| lplr | -1.279276* | 0.1245801 | 0.2889669 |
| _constant | 2.581705* | 0.1749527 | 0.3043163 |
| Log likelihood = -117.12094<br>Pseudo R2 = 0.4653 | | | |

*logFine=Fine

All coefficient are statistically significant, at the 1 percent level *logFine* and *lpsr2*, at 10 percent level *lpsr* and *lplr*. All coefficients are as expected, except the coefficient of *lpsr*. The estimated *lpsr* coefficient is positive. This result shows that the introduction of LP in April 2007 did not reduce the number of infringers. This absence of evidence about program's effect means that the program did not make a positive impact on prevention. Not only have more stable cartels

remained (with fewer participants), but also less stable cartels. A significant number of applications (500 in a year) for full or partial immunity from fines in exchange for disclosure of information regarding cartel operation does not mean that incentives to create cartels decrease. And the reform of the LP in 2009 led to cartels being operated by only a small number of participants. This suggests that less stable collusions either were not created, or collapsed, and only the more stable ones survived. But this could be viewed as evidence that the LP reforms reduced the incentives to be involved in illegal activities.

The average number of cartel discoveries increased until 2008 and then decreased. (Figure 1).

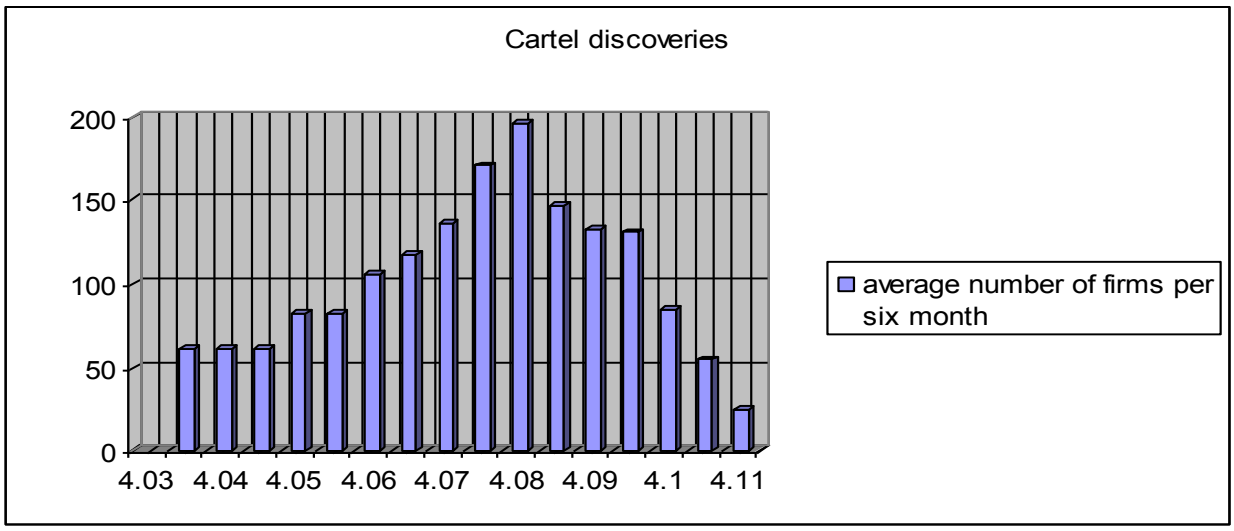


Fig.1. The number of cartel discoveries per six-month period during 2004-2011. *Source:* Author's calculation based on FAS data. ( horizontal axis – period, vertical axis - average number of firms per six month)

The information presented in Figure 1 is important to confirm the hypothesis about positive influence of LP on the detection of cartels and the break up of unstable cartel agreements.

Although fines are the primary instrument in the prevention of antitrust violations, the results show this to be the smallest coefficient among independent variables. In other words fines create a credible threat of being prosecuted and sanctioned. With the increase in fines the number of participants in a cartel decreases. This is because the opportunity to be the first to receive full or partial immunity from fines reduces the incentives to support the cartel agreement. The results in table 3 suggest that an increase in the expected profit with fewer cartel members compensates for the decrease in the expected profit if fined.

Table 4 presents the Poisson regression results when the dependent variable is cartel duration between market participants *(dur)* in the market *i* for the period *t* expressed in months. All estimated coefficients are statistically significant at the 10 percent level and correspond to the expected ones.

**Tab. 4. The Poisson regression results for cartel duration**

| dur | Coef | Std. Err | Robust Std. Err |
|---|---|---|---|
| logFine* | -0.0134437* | 0.0050075 | 0.0120555 |
| lpsr | 0.6262311* | 0.1201631 | 0.5470101 |
| lpsr2 | -0.1439385* | 0.096396 | 0.2153599 |
| lplr | -1.779363* | 0.0959689 | 0.2006325 |
| _constant | 3.755647* | 0.0922508 | 0.5567245 |
| Log likelihood = -174.94765<br>Pseudo R2 = 0.5309 | | | |

*logFine=Fine

The hypotheses about influence of penalties and LP is not rejected. Even having few firms in LP does not decrease the efficacy of cartel enforcement.

Tables 5, 6, 7 show results for agreement type, antimonopoly policy, market and industry characteristics, actions of participants inside of cartel. In table 5 the coefficient of *lpsr2* were not significant. The coefficients of variables *price fixing* and *bid rigging* are significant and positive suggesting that the reform of 2009 showed that cartel agreements were concluded not only with few cartel participants, but that such cartel agreements used price fixing and bid rigging. The analysis of decisions implemented by the competition authority provided evidence that between 2004-2011 most infringements were price-fixing agreements.

**Tab. 5. The Poisson regression results for number of infringers and different type of infringements**

| firms | Coef | Std. Err | Robust Std. Err |
|---|---|---|---|
| pf | 0.9978697* | 0.2840841 | 0.340056 |
| br | 0.8525182* | 0.3217617 | 0.7109076 |
| lplr | -1.375913* | 0.1403818 | 0.3645105 |
| lpsr | 0.9804433* | 0.2078715 | 0.3865184 |
| _constant | 1.620994* | 0.3215806 | 0.4680362 |
| Log likelihood = -144.69296<br>Pseudo R2 = 0.3394 | | | |

The coefficients *(lpsr2)* and *(ms)* are insignificant.

The hypothesis is that industries with low concentration will show a decrease in cartels. Table 6 shows the hypothesis is confirmed. The coefficients of variables are negative and are statistically significant at the 1 percent level (celec), at 5 percent level (memp), at 10 percent level (ops). The regression results also confirmed that in highly concentrated and middle-concentration markets it was possible to observe a decrease of cartel practice.

**Tab. 6. The Poisson regression results for the number of infringers and different market structures**

| firms | Coef | Std. Err | Robust Std. Err |
|---|---|---|---|
| celec | -1.43045*** | 0.5983641 | 0.4679239 |
| ops | -0.7739684* | 0.4392049 | 0.4857403 |
| wr | -0.8019704** | 0.4072351 | 0.3510851 |
| memp | -0.4743288** | 0.3949478 | 0.2171687 |
| tr | -1.868725* | 0.7083121 | 0.3473429 |
| lplr | -1.894698* | 0.109392 | 0.2282764 |
| lpsr | 1.228087* | 0.1620262 | 0.3232991 |
| _constant | 3.888821 | 0.4299459 | 0.4942638 |
| Log likelihood = -131.31579<br>Pseudo R2 = 0.6479 | | | |

The coefficients (lpsr2) are not significant.

Table 7 shows that the hypothesis about the impact on cartel discipline of various internal mechanisms is confirmed. The coefficients of all variables are positive and statistically significant at the 1, 5 and 10 percent level except coefficients of *lpsr2*, *ret*, *sidarr*. The results of the regression suggest that various disciplinary mechanisms can promote the stability of cartels. Interestingly, the results provide little support for the empirical findings of Fraas and Greer (1977). that a set of such mechanisms can promote obvious and silent collusions in more adverse markets.

**Tab. 7. The Poisson regression results for the number of infringers and "Facilitating and self-enforcing techniques"**

| firms | Coef | Std. Err | Robust Std. Err |
|---|---|---|---|
| comp | 0.600616** | 0.2643352 | 0.3070431 |
| th | 2.214899*** | 0.2198216 | 0.231081 |

| | | | |
|---|---|---|---|
| infex | 0.8726806*** | 0.1972473 | 0.3263889 |
| prl | 1.630867*** | 0.2920376 | 0.4504259 |
| rinlead | 0.5388162* | 0.2046806 | 0.2997398 |
| lplr | -1.607403*** | 0.2435223 | 0.3047669 |
| lpsr | 0.8461943** | 0.2343524 | 0.3815821 |
| _constant | 1.347918 | 0.3031376 | 0.4524254 |
| Log likelihood = -88.648824<br>Pseudo R2 = 0.5953 | | | |

The coefficients *(lpsr2)*, (*ret),(sidarr)* showed insignificant mean.

## CONCLUSION

The antitrust authority in Russia guarantees early cartel confessors full amnesty from prosecution. The academic developments about the enforcement of Leniency are the prospective direction of empirical researches around the world. The empirical assessment of LP effects within the framework of institutional research in Russia allows us to show the influence of rule changes on the conduct of market participants. In particular, the impact of the LP on cartel stability which promotes increased efficiency of antimonopoly policy as a whole. But not every agreement entered into by competitors is prohibited. Agreements that are very likely to harm completion and have no significant positive effect on competition are considered per se unlawful. So the current research considered the horizontal agreements which were illegal in the antitrust legislation of the majority countries. The basic hypothesis was that the introduction of such programs leads to increased cartel discoveries and the reveals the characteristics of those cartels which continue to exist. The results of empirical assessment of LP efficacy in Russia in the context of institutional researches showed the influence of rules change on the behavior of market participants. The hypothesis about the decrease in the number of cartel participants and number of cartels was confirmed only after the reform of LP in 2009. The results can be regarded as evidence that only small cartels survived, bigger cartels that are less stable either were not created, or collapsed.

The insert additional indicators of efficacy of the Leniency program into Poisson regression provided to receive the results which also confirmed that the hard-core cartels are more stable under different market structures. The database of additional indicators included the type of agreements, market structure where cartel activity took place, the actions of cartel membership to maintain cartel stability.

Even in an imperfect institutional environment the implementation of LP had positive results only after the reforms of 2009.

Appendix 1. Tab. 1. Horizontal agreement data

| | *Market* | *Cartel duration (estimated)* | *Cartel membership* | *Total market share* | *Participation in leniency scheme* | *Imposed penalty* | | *Type of infringement* | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | *Penalties, USA ($)* | *no data* | *PF* | *MS* | *BR* |
| (1) | (2) | (3) | (4) | (5) | *(6)* | *(7)* | | *(8)* | *(9)* | *(10)* |
| 1 | financial services | 07.2007 – 09.2008 | 37 | n/a | + 37 members | | * | + | - | - |
| 2 | dredging repair work | 01.2009 – 11.2009 | 2 | n/a | - | 276,417 | | - | - | + |
| 3 | food salt | 02.2010 – 01.2011 | 4 | n/a | + one member | 366,972 | | - | + | - |
| 4 | cover plate and aluminum alloy | 12.2008 – 12.2009 | 4 | n/a | - | | * | - | + | - |
| 5 | forge coal | 10.2009 - 11.2010 | 9 | n/a | - | 17,370,031 | | + | + | - |
| 6 | mobile phones | 01.2009 - 06.2009 | 6 | n/a | + one member | | * | + | - | - |
| 7 | transport equipment | 01.2009- 12.2009 | 26 | 70% | - | | * | - | + | + |
| 8 | liquified hydrogen gas (retail) | 12.2008- 03. 2010 | 3 | n/a | - | 9,174 | | + | - | - |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 9 | industrial explosives | 01.2009-03.2009 | 7 | small share, highly competitive market | - | 1,131,499 | | + | - | - |
| 10 | snowmobiles | 02.2008-12.2008 | 3 | snowmobiles "Buran" и "Taiga" - 46% in 2008 | - | 152,905 | | + | + | - |
| 11 | financial services | 01.2003 – 04.2008 | 51 | n/a | - | | * | + | - | - |
| 12 | milk products, mayonnaise, margarine | - | 2 | 99% | - | 4,789 | | + | - | - |
| 13 | liquid chlorine | 01.2008- 01. 2010 | 11 | member'shares in the market 47,9%, 19,2%, 14,3%, 8,6%, 10%. | + 5 members | | * | + | + | - |
| 14 | cash register equipment (production and sales) | 10.2008 – 12.2010 | 4 | n/a | - | 48,393 | | + | + | - |
| 15 | caustic soda | 01.2006-12.2010 | 23 | Total share of sale was in 2006-2010 years 77,2%-62,5% | - | 28,577,982 | | + | + | - |
| 16 | wholesale fruit and vegetables (Moscow region) | 07.2008 07. 2009 | 4 | n/a | - | 160,803 | | - | - | + |
| 17 | safety control system service | 03.2010-05.2010 | 7 | n/a | - | 242,345[5] | | - | - | + |
| 18 | alcohol (wholesale and retail) | 2006-2010 | 34 | n/a | - | | * | + | + | - |
| 19 | alcohol (wholesale and retail) | 01.2007 – 12.2008 | 27 | in 2007 86% in 2008 79% | - | | * | + | - | - |
| 20 | food (wholesale and retail) | 07.2010 | 4 | n/a | - | 70,735 | | + | - | - |
| 21 | matches | 8 years | 8 | more than 90 % | + | | * | + | - | - |

[5] http://pravo.ru/news/view/49565/

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | all members | | | | | |
| 22 | cash register equipment | 05.2009-09.2009 | 6 | n/a | + all members | | * | - | + | - |
| 23 | potash chloride | 12.2008-06.2009 | 3 | 50% | - | 8,091,651 | | + | - | - |
| 24 | cash register equipment | one year | 4 | n/a | - | 12,232 | | + | - | - |
| 25 | taxi services | 03.2010-05.2010 | 9 | n/a | + one member | 3,670 | | + | - | - |
| 26 | gas service (the Republic of Bashkortostan) | 06.2007-12.2007 | 2 | more than 35 percent | - | 42,487 | | - | + | - |
| 27 | soft cable compound | 11.2004-12.2005 | 21 | n/a | - | | * | + | + | - |
| 28 | thermal energy (Perm) | 01.2008 – 10.2008 | 2 | n/a | - | 1,817,766 | | + | + | - |
| 29 | milk products | n/a | 4 | n/a | + all members | 4,183 | | - | + | - |
| 30 | construction (Perm region) | 06. 2008 | 2 | 50% | + one member | 133,285 | | - | - | + |

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www.fas.gov.ru



## Contact details:

Gyuzel F. Yusupova
National Research University Higher School of Economics (Moscow, Russia).Faculty of Economics. Department of Applied Economics (Associate professor), Institute of Industrial and Market Studies. Researcher;
E-mail: GYusupova@hse.ru