**CAN THE LENIENCY PROGRAM DETER COLLUSION IN YOUNG COMPETITION JURISDICTION OF TRANSITION ECONOMY[[1]](#footnote-2)?**

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**Abstract:**

The analyses of the effects of Leniency Program (LP) on stability and duration of collusions increases the efficiency both the work of the antimonopoly authority and the antimonopoly policy in general. Empirical analyses of the effects of LP are still rare. They bring controversial results even for developed competition jurisdictions. Leniency Programs in developing and transition countries are still under-investigated. The paper fills the gaps between the scale of application of leniency program (LP) almost in every competition jurisdiction in the world and the concentration of the effect assessment on developed countries only. My research presents a method which estimates LP impact on the behavior of market participants based on Russian data on detected collusions and their characteristics during the period 2004-2011. Rule of full immunity for every application, introduced by 2007 edition of LP in Russia, supports incentives to commit to collusion, instead of refraining from illegal price fixing or market sharing. Recent edition of leniency that has been in place since 2009, in contrast, enhances profitability of deviation from collusion, making collusions unstable.

**Key words:** Leniency Program, Collusion, Antitrust legislation in Russia, Transition economy, Competition Jurisdiction

**Аннотация:** Анализ воздействия программы освобождения от наказания (LP) на устойчивость и длительность картельных соглашений способствует повышению эффективности, как работы антимонопольного органа, так и антимонопольной политики в целом. Однако эмпирических оценок эффектов данной программы не так много, при этом результаты оказываются достаточно противоречивыми даже для развитых антимонопольных юрисдикций. Для развивающихся стран и стран с переходной экономикой программа освобождения от наказания еще недостаточно изучена. Поэтому представленная работа демонстрирует результаты эмпирического анализа применения программы, компенсировав тем самым пробелы между масштабом применения программы освобождения от наказания почти в каждой юрисдикции по конкуренции в мире и концентрацией оценки эффектов данной программы только в развитых странах. Описанный в работе метод позволил оценить воздействие программы на поведение участников сговора на примере российских данных о характеристиках обнаруженных сговоров за период 2004–2011 гг. Правила получения полного освобождения, представленные в первой версии программы 2007 г. в России, не снизили стимулы участников сговора отказываться от таких соглашений. А вот более поздняя версия, введенная в 2009 г., наоборот, повысила стимулы к отклонению от участия в подобных соглашениях, снижая тем самым устойчивость сговора.

**1 Introduction**

The system of sanctions plays a key role in antimonopoly policy of all countries. The actions of the state are concentrated on detection and identification of antitrust violations and punishment for them. It is supposed that sanctions must provide the potential violators of law with incentives not to violate because of unprofitability. The application of penalties for the violation of law creates similar incentives.

The application of Leniency Program (LP) is self-contradictory as long as it  increases the sanctions when one participant of collusion is granted full immunity from fines. On the one hand, LP plays an important role as a source of information about the collusions. On the other hand, LP is an instrument of impact on the incentives of participants to complete the illegal agreements. Despite LP decreases the sanctions, at the same time the expected sanctions increase. The reason is that the possibility to enforce the sanctions against the collusion participants heightens. The expected sanctions can make participants refuse to conclude an agreement. But if the agreement has been already concluded, the size of sanctions does not make the impact on the interest to continue to participate in it. This problem is solved by the leniency program.

Empirical analyses of the effects of LP are still rare. They bring controversial results even for developed competition jurisdictions. Leniency Programs in developing and transition countries are still under-investigated.   
My research presents a method which estimates LP impact on the behavior of market participants based on Russian data on detected collusions and their characteristics. Our method includes the possibility of replacing the threshold discount factor (which is usually used in theoretical settings as an *indicator of collusion sustainability*) by the number of collusion participants and industry concentration. This method also shows that not only the number of collusion participants and industry concentration but there is a possibility of other efficiency criteria of LP enforcement, for example, the duration of collusion. So, our method predicts that the introduction of LP impacts collusion sustainability, which means the behavior of market participants will be able to decrease the collusion stability with possibility either to destroy the existing collusion, or to prevent an appearance of a new one. Our empirical analysis gives us an opportunity to receive such evidences through decrease in participants number of collusion discoveries and decrease in collusion duration, except the evidence of decrease in number of collusion in the low concentration industries. Structural market conditions (the number of buyers or sellers, behavioral factors within the industry) affect the stability of tacit and explicit collusions. Such conclusions were made in the empirical analysis of Fraas and Greer (1977).

LP was introduced in Russia in 2007 for the first time, but after two years it was reformed as the initial version did not fulfill the criteria of the effective program and did not provide the deterrence effect for collusion (Shastitko and Avdasheva, 2011). Initially, Russian Administrative Offences Code provided immunity for any person who has voluntary informed the Federal Antimonopoly Service (FAS) about the facts of collusion or concerted practice. It means that *every* collusion participant can obtain leniency, and that decreases the expected fine on the collusion participants to zero. Moreover, possibility of immunity motivates companies, which were suspected by mistake, to apply for leniency and therefore commit to be a collusion participant. In this way leniency program results in *false convictions* and strengthens the inadequacy of anti-collusion enforcement. Since the summer of 2009 only the whistle blower receives the full immunity. The infringers are fined, and since the end of October 2009, criminal liability has been applied. New version of the program allows to hope for effective prevention of collusion. However, it was not clear without special analysis if improvement of the leniency rules overcomes the negative externalities of the early version of the program and imperfection of anti-collusion enforcement.

The competition authorities in many countries use different schemes of LP to avoid fines for the violation of competition law. In the USA collusion participants are granted full immunity from fines in exchange for the disclosure of information regarding the collusion. In the European Union collusion participants are granted full or partial immunity. In the USA the degree of immunity does not depend on the informative value. In the European Union conversely, it does depend on the informative value. Other collusion participants in the USA do not have the opportunity to obtain immunity, but in the European Union they do. Similar programs were introduced in 2002 in the UK and other European countries. The analysis of their effects showed that there are fewer collusions when the program is applied ( Motchenkova , 2005).

LP is an example of academic models which have been introduced into antitrust enforcement (Motta and Polo, 2003; Aubert et al., 2006). Nevertheless, there are still many questions connected with LP, not only in Russia, but also in international research. In particular, how the market characteristics and national antitrust legislation influence the effects of LP. It is especially not clear how the results of research can be put into practice in a country with lack of experience in antitrust policy. For example, the analysis of LP effectiveness in Russia is very different. At first glance, LP had a moderate impact on discoveries and deterrence. The demand for leniency is decreasing: since 2009 there have been only about 20 applications for leniency annually, while in two previous years the number of applications exceeded 500. However, the main evidence of LP effectiveness would be the decrease in number of illegal collusions but not in the number of applications.

This research follows the traditions of Aubert et al. The research studies the impact of LP on the market but not on the Federal Antimonopoly Service. The main result confirming LP effect is a decrease in the stability of collusions, illustrated by the break up of already existing collusions and the lack of incentives for new ones (Aubert et al, 2006). In theoretical settings (Ivaldi et al., 2003) a discount factor serves as an indicator of collusion sustainability. The approach applied here uses the possibility of replacing the threshold discount factor by the number of collusion participants or the industry concentration following the approach of Fraas and Greer (1977). This paper presents the approach which estimates LP impact on the behavior of market participants on the basis of Russian data about the characteristics of detected collusions.

The purpose of the research is the empirical assessment of LP as an instrument to prevent collusions in Russia. The results will help to interpret carefully the impact of LP on collusions.

The article is organized as follows: Section 2 focuses on the predictions of theoretical models about the analysis of LP and on the empirical assessment of LP effects respectively; Section 3 describes enforcement of antitrust provisions against collusion in Russia; Section 4 presents the methodology of empirical analysis; Sections 5 and 6 describe the sources of data on collusions in Russia and main empirical hypotheses; Section 7 provides results; Section 8 gives the final conclusions.

**2 Leniency Effects: survey of Literature**

During the last twenty years the attention has been paid to LP in antitrust (Zhijun and Rey, 2012) and the probability of repentance when it is necessary to enforce penalties (Segerstrom, 1988). Of course it was necessary to implement with effective anti-cartel rules. So many countries have enacted and later amended competition legislation, particularly in developing and transition countries. Thus, in 2007, of 151 developing countries 77 had enacted antitrust legislation and appointed antitrust authorities, while in 1990 this figure stood at just 10 (Waked, 2010). A well-designed competition law has been a part of the competition policy framework. Nevertheless, central elements in anti-cartel program – such as detection, leniency programs – are still not present or implement more slowly than responsibility of collusions in many developing economies. The explanation of this fact is that some developing countries typically adopted the competition frameworks of more advanced economies. But these countries do not have enough experience or large body of jurisprudence to be adequate to effectively deter cartel agreements. Or the tools to deter cartel behavior like leniency programs and commitments are not in place (if not set in the law). This fact creates difficulties of implement in practice. In practice, if the legal framework allows for criminal sanctions but there is no effective cooperation with public prosecutors, leniency provisions have limited effect. In the absence of effective leniency programs, competition authorities typically rely on indirect evidence to support their decisions, which makes them more susceptible to judicial annulment.

The effects of program are assessed for developed antitrust legislations such as the US and the European Union, but not for countries with relatively young and imperfect competition enforcement. Effectiveness of LP might be affected by overall quality of provisions against collusion in several ways. First, leniency is effective only if legally prescribed sanctions are high enough. Second, leniency is effective only if probability of detection and fines for the collusion when nobody applies for leniency is high enough. Third, probability of false conviction (Type I legal error) should be low enough. It is not certain that all these conditions are satisfied in the emerging competition enforcement. Russia represents the example of imperfect enforcement against collusion, that is why the effects of leniency may differ from those in the European Union or the United States.

*2.1 The theory of Leniency effects on collusion*

An empirical assessment of LP effects follows theoretical predictions about the impact of LP on equilibrium and enforcement. Two approaches for the assessment of LP effects are provided by Motta and Polo, (2003); Aubert et al., (2006). In terms of the first approach, the indicator of success is a reduction in antimonopoly expenditure for one investigation and the reduction of investigation time. The second approach shows a mechanism of incentives for companies that refuse to participate in collusions. When firms can use LP, collusion remains less sustainable. Thus, the indicator of success is a refusal to participate in collusion.

In Motta and Polo’s paper the main effect of LP is to reduce the expenditure of the antitrust authority on investigation. They indicate that if the resources available to the antitrust authority are sufficient to prevent collusion using full fines, leniency program should not be used. LP can be used as a second best instrument. However, when the antitrust has limited resources, leniency program may be optimal. In terms of this approach the indicator of success is a reduction of the antimonopoly expenditure for one investigation and the reduction of investigation time.

Contrary to Motta and Polo (2003); Aubert et al. (2006) show a mechanism of incentives for firms that refuse to participate in collusions. They focus on the consequences of rewards on decisions taken within collusion and within firms. Their research investigates the effect of LP on the behavior of market participants. They argue that more generous programs, offering positive rewards to firms but also to individual informants, might be more effective. In their model the discount factor is used as indicator of LP effect. There are such values of discount factor when the collusion is sustainable without LP but collusion remains less sustainable when firms can use a leniency program.

My approach follows the approach of Aubert et al. (2006) about the impact of LP on the incentives of market competition, but not on the expenditures of the antimonopoly authority.  In this paper I will demonstrate the impact of LP on the behavior of market participants through their incentives to report about collusion.

These two theoretical approaches correspond to an empirical works which are devoted to the assessment of LP effects.

*2.2 Empirical assessment on Leniency effects*

Empirical assessments of LP effect for the European Union are presented in the papers of Klein (2010) and Marvao (2010). And for the USA in the papers of Connor (2005) and Miller (2009). In the case of developing and emerging economies only handful of such countries have anti-cartel leniency programs. But some empirical assessments of those programs are made and presented in the papers of Rumak & Sitarek (2009), Levenstein & Suslow (2004),Cornoiu-Jitarasu (2013). I should however mention that systematic evidence is not collected yet. Specifically, in contrast to young competition jurisdictions in the country with stable political and legal system (for instance, Korea, Koh [Sae Ran](http://jcle.oxfordjournals.org/search?author1=Sae+Ran+Koh&sortspec=date&submit=Submit) Jeong [J.,](http://jcle.oxfordjournals.org/search?author1=Jinook+Jeong&sortspec=date&submit=Submit) 2014), there is relatively little evidence on the effects of leniency in transition countries. Typically articles explain the legal changes but not their effects (see the paper on Romania, Cornoiu-Jitarasu, 2013).

A different assessments of LP can be illustrated by a comparison of the methods in the papers of Miller (2009) and Klein (2010). The research of Miller is devoted to the assessment of LP in collusion enforcement in the United States. In particular, the author tested the efficacy of the leniency program which was improved and extended in August 1993. The first Corporate Leniency Program was introduced in 1978. By using information reports of U.S. Department of Justice Miller collected data to construct a time series of collusion discoveries from 1985 to 2005. Miller tested the dependence of collusions 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. The various specifications of model showed that LP had a significant influence on the increase detection ratio of the collusion number. Among the other factors, Miller (2009) showed that the number of collusion discoveries increased around the date of leniency introduction and then fell below pre-leniency levels, and argued that the pattern was consistent with enhanced collusion detection and deterrence capabilities.

Klein (2010) estimated the reaction of markets (following to the model of Aubert et al, 2006), in particular the influence on the behavior of market participants whether or not LP was applied. For this purpose the indicator "share of profit in the price" (close to Lerner index) was used for competition intensity as a dependent variable, broken down by EU types of activities. The indicators of separate tools of economic policy (including LP) were used as independent variables and structural characteristics of activity. The profit reduction in highly concentrated types of activities was interpreted as evidence of collusion refusal which has been presented as a LP effect. However, the weakness of this analysis is the complexity of interpreting the Lerner index. This problem has been widely studied in modern empirical researches of markets: a high Lerner index indicates market power and a high role of non-price competition in the market, and low costs (for example, from accounting policy). The correlation of this indicator with competition and with its restrictions is not obvious. Trying to show the impact of LP on the market, this approach may have a problem of unobservability. Lerner index has an impact on many market characteristics but at the same time there are economic factors which have an impact on Lerner index.

Marvao (2010) studied the factors which influence the decision of European Commission about proportion of fine reduction and impact of leniency on investigation duration. The main question of her paper was what could a firm expect when reporting to the antitrust authority, in terms of percentage fine reduction under LP. To answer the question the author first studied a possibility of introduction LP and fine reduction. Then the author used regression analysis of quantitative decrease in fines. The analysis showed that much higher fine reduction is guaranteed only the first reporter about the existing collusion. Second, the introduction of LP decreases the length of the investigation.

The approaches described in papers of Miller (2009), Marvao (2010) follow Motta’s approach and affect the antitrust enforcement. Miller showed that the detection of collusion took less time under existing expenditures. That is under the existing scale of expenditures detections will be more. Leniency may encourage new collusions to form when detection probabilities change stochastically if firms anticipate smaller penalties (Motta and Polo, 2003). I also follow the approach of Aubert et al. (2006) about the impact of LP on the incentives of market competition, but try to solve the problem of unobservability.

The other research which measured the effects of LP on the duration of collisions from 1990-2004 also showed that the introduction of LP considerably reduced collusion duration ( Zimmerman and Connor, 2008). The regression results in this paper demonstrated the significance of explanatory factors: market structure, internal collusion organization, industry-specific conditions, external macro-economic conditions, and antitrust law environment. The authors showed that industry concentration and market share had positive effects on collusion duration, several internal collusion characteristics had also some statistical significance on collusion duration, such as the number of participating firms, overcharge percentage, cultural diversity, and bid-rigging conduct. The analysis of 1990-2004 discovered that LP had an increasingly significant negative impact on collusion duration.

The specific objective of this article is to measure the impact of LP effects on the detection of collusions with Russian data. In this case we follow the approach of Marvao. That is I study the impact of LP on the behavior of collusion participants through their incentives to report to the antitrust authority about the existing collusion. In this case I want to prove that the collusion stability is decreasing. On the other hand, it is important to study the impact of LP on deterrence of market participants to collude decreasing the problem of unobservability. The diagram 1 presents the connection between theoretical and empirical approaches of LP effects and also the connection with our research.

**Effects of Leniency**

**for antimonopoly**

**authority**

**for market**

**participants**

**to decrease**

**cartel stability**

**to destroy**

**the existing collusions**

**not to create new ones**

**Theoretical approach:**

***Motta & Polo ( 2003)***

Empirical approach

**Miller (2009)**

Empirical approach

**Marvao (2010)**

**Theoretical approach:**

**Aubert et al. (2006)**

Empirical approach

**Klein (2010)**

**Diagram 1. The connection between theoretical and empirical approaches of LP effects.**

At the same time there are still many questions connected with LP in Russia and elsewhere. In particular, how market features work where LP is in effect and how the features of national antitrust legislation influence LP efficiency (Avdasheva and Shastitko , 2011). The answers to these questions are important for the improvement of LP practice in Russia. The relevance of LP efficiency with the diversification of the activities of the Federal Antimonopoly Service (FAS) in Russia is that LP decreases the cost of prosecution because of the information reported by collusion members.

The same questions connected with LP are raised in the antitrust policy of developing countries. Unfortunately, a handful of developing countries actively fights collusions, including through the use of leniency programs. But the imperfection of enforcement (Cornoiu-Jitarasu, 2013), (Levenstein & Suslow, 2004) makes doubtful about the reasonability of such a delicate tool as LP. Though there is a good experience of the impact of leniency program on cartel stability in Korea ([Choi, Yun Jeong](https://www.econbiz.de/Search/Results?lookfor=%25252522Choi%2525252C+Yun+Jeong%25252522&type=Author), [Hahn, Kyoung Soo](https://www.econbiz.de/Search/Results?lookfor=%25252522Hahn%2525252C+Kyoung+Soo%25252522&type=Author), 2014). The authors estimated the cartel stability by applying a semi-parametric hazard model to a unique data set of 619 discovered cartels. Their estimations of LP effects depend on the period (short rut or long run) the introduction and revision of leniency impacts on cartels. In the short run, the introduction and revision of LP reduced a cartel dissolution rate and resulted in longer cartel duration. But, in the long run, the introduction of LP increases the cartel dissolution rate and decreases cartel duration. As a consequence of the leniency program, the Korea Fair Trade Commission's enforcement on cartels has become more effective.

**3 ANTITRUST ENFORCEMENT AGAINST COLLUSIONS IN RUSSIA**

First competition law in Russia (1991) contained provisions against collusions. However, the sanctions for cartel were extremely low and unable to deter conspiracies. In the Law "On Protection of Competition" adopted in 2006 the ban on illegal horizontal agreements is described in the part 1 of article 11. The Law "On Protection of Competition” has been updated since 2006. Some changes concerning article 11 were adopted. The first version of this article describes the ban on illegal horizontal agreements as:

"Agreements between competing economic entities - that is economic entities that sell goods on the same market, shall be recognized as cartels and shall be prohibited if such agreements lead or can lead to:

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

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

3)market sharing, 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".

The last version of article 11 emphasizes hard-core cartels (price-fixing, market sharing, bid riggings and output restriction). These agreements are included in the list of prohibited activities. Hard-core cartels are prohibited per se. And the other types of restricting activities include: refusal to conclude contracts; imposing contractual terms on a counteragent, which are disadvantageous for the latter or are not connected with the subject of the agreement; unjustified establishment of different prices (tariffs) for the same goods; creation of barriers to entry the market; establishment of conditions for the membership in professional and other associations. Differentiation between them is made in the formula of calculating the respective fines for such violations.

In 2007 turnover penalties replace fixed penalties for the collusion. Two fold cap for penalties is established: 15% of the company’s turnover on the market affected by collusion but not more than 4% for highly specialized sellers. The infringements number of the Russian antitrust legislation on the part 1 of article 11(collusion and concerted practices) increased by 18% from 2014 to 2013[[2]](#footnote-3). Average infringements of antitrust law were about 260 annually in 2010-2014. Indeed the dynamic of the infringements number decreases from 2010 to 2012. The smallest number (only 168 infringements) was in 2012. Since 2012 to 2014 the infringements number increased. Increasing penalties created prerequisites for effective deterrence. For example, from 2010 to 2013 the rate of penalties increased from 0,9 to 3,9 bn rubles[[3]](#footnote-4).

But imposed penalties on collusion have remained modest in comparison with the penalties which 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 fines 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 and Miller, 2013). In Russia the highest penalty since 2008 has been about 23 million euro (or 32 million US dollars) and was imposed in 2012. But the number of hard-core collusions was very small (only 30 cases) from 2004 to 2011, the total amount for such violation was very modest: only 58517, 3 million dollars US. In Russia the penalties on collusion infringements have remained modest (Appendix, tab.1).

Dawn raids under Russian antitrust law are begun not long ago. But such raids gave a possibility to Federal Antitrust Service (FAS) to detect the largest collusions. Thus, in 2013 FAS made 62 raids. So, according to rating of Global Competition Review Russia took first place on the dawn-raids over 2013.

At the same time leniency program for cartel participants was introduced. The competition authorities in many countries use different schemes of LP to avoid fines for the violation of competition law. In the USA cartel participants are granted full immunity from fines in exchange for the disclosure of information regarding the cartel to the competition authority. In the European Union cartel participants are granted full or partial immunity. In the USA the degree of immunity does not depend on the informative value. In the European Union conversely it does depend on the informative value. The other cartel participants in the USA do not have the opportunity to obtain immunity but in the European Union they do.

There were two conditions for application: refusal to follow unlawful agreement and reporting to antitrust authority. However, the number of applicants was not limited to the first applicant only. In Russia LP was first introduced in 2007, but after two years it was reformed as the initial version did not fulfill the criteria of effective program and did not provide the necessary incentives for market participants (Shastitko and Avdasheva, 2011). Initially Administrative Offences Code provided immunity for any person who has voluntary informed the antimonopoly authority about the facts of collusion or concerted practice. The program was practiced at the same time when a turnover penalties for collusion and abuse of dominance were introduced. Since the summer of 2009 only the whistle blower can receive the full immunity. The infringers are fined, and since the end of October 2009 the infringers have criminal liability. The cartel initiator can be exempted from liability if this initiator is the first declared. Any cartel participant can inform about the cartel to the competent competition authority. But as in EU the degree of immunity depends on the informative value about the cartel.

The updating of LP gives the chance to check efficiency of this tool. It is necessary to expect that the revised edition of LP will impact on behavior of market participants, instead of the initial version. At the same time experience of imperfect enforcement against cartel may neutralize the possible positive effects of the program improvement.

Imperfect leniency program coincides with important drawbacks of anti-collusion enforcement. Due to insufficient experience Russian competition authorities do not always identify unlawful collusion correctly. Sometimes false convictions are made by punishing agreements, which are not price-fixing or market-sharing conspiracies. Effects of such decisions attract special attention of the Russian experts (Pavlova and Shastitko, 2014). Additional problem is the limited power of competition authority in organizing dawn-raids: the Federal Antimonopoly Service is unable to do it by it’s own, and requires cooperation with the authorities responsible for criminal investigations in Russia.

That is why testing the hypothesis on the impact of leniency in Russia deserves special interest.

**4 METHODOLOGY OF EMPIRICAL ANALYSIS**

If collusions can be divided in sustainable and not sustainable, the introduction of LP should decrease the number of collusions first of all at the expense of those collusions where to keep the sustainability has been difficult even before. In theoretical settings (Ivaldi et al, 2003) a discount factor serves as an indicator of collusion sustainability. The main result, confirming LP effect, is a decrease in collusions stability, illustrated by the break up of already existing collusions and the lack of incentives for new ones (Aubert et al, 2003). So it is necessary to demonstrate how strong the impact of LP is on the behavior of market participants through their incentives to distort collusions. The results of Aubert et al (2003) predict that the introduction of LP shifts the threshold discount factor. This should distort collusion implying relatively low discount factor (see the interval AB in fig.1). The interval AC describes the discount factor for which collusion is sustained before leniency. The interval BC describes the discount factor for which collusion is sustained after leniency.

0

1

δ0

δ1

A

B

C

*Fig.1. The influence of LP on the discount factor as an indicator of collusion sustainability*.

Method applied here uses the possibility of replacing the threshold discount factor by the number of collusion participants and industry concentration, following the approach of Fraas and Greer (1977). Fraas and Greer (1977) showed, first, the structural conditions most favorable to tacit cooperation are 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 first to match these conditions with collusion stability.

Fraas and Greer (1977) were first who confirmed empirically that the participants of collusion have other characteristics than those who are not collusion participants. The market conditions (the number of buyers or sellers, behavioral factors within the industry) affect the stability of tacit and explicit collusions. Such conclusions were made in the paper of Fraas and Greer (1977). On using the data about illegal explicit collusions which were obtained from summaries of all antitrust cases initiated between 1910 and 1972 by the Department of Justice, the authors yielded a sample of 606 cases of explicit price fixing. These 606 cases were assigned to one of the seven different commodity categories on the basis of the product involved: natural resources (including mining), manufacturing, distribution (wholesaling and retailing), contract construction, finance-insurance, transportation, and services. In addition, all reported characteristics or complexities were divided into12 separate categories and attributed to each case whenever mentioned. These categories included the number of companies involved, trade association involvement, foreign participants, bid rigging involved and etc. Their approach showed that in general, collusive conduct ranges over a continuum from tacit cooperation to formal collusion to independent action as structural conditions become increasingly adverse to collusive behavior.  
 So I am showing the influence of other observable factors like number of collusion participants or industry concentration in sustainability of collusions when LP is applied (see fig.2 and fig.3). The influence of these factors can be an evidence of LP efficiency. In the fig.2 we can see the reduction of collusion participants as indicator of LP effect (n0 moves in the position n1). It means that after introduction of LP only collusions with small number participants can keep their sustainability. The interval AB in fig.2 demonstrates effect of LP: less sustainable collusions are distorted.

2

∞

n1

n0

A

B

C

*Fig.2. Number of participants as a indicator which distort collusion*

The fig.3 shows the change of industry concentration (HHI) as indicator of LP effect when the program is applied. And again we can see the same results from the impact of LP on collusion sustainability. All other things are constant, if market concentration is higher (HHI1>HHI0 see in fig.3), the sellers will refuse competing and will try to maintain high prices and market sharing. In the markets with low concentration the number of collusions decreases. The interval AB demonstrates effect of LP: collusions are distorted in the low concentrating markets. The sustainability of collusions is kept in the markets with high concentration.

0

1

HHI0

A

B

C

HHI1

*Fig.3. The meaning of industry concentration in the case of collusion distortion.*

The additional indicators of the LP enforcement (the characteristics of agreements, the market structure where agreements are concluded, the enforcement mechanisms inside of collusion) can also be used as the evidence of LP efficiency (Fraas and Greer, 1977 ).

If collusions are relatively divided into “not hard-core collusions” and “hard-core collusions”, the LP enforcement should decrease the number of collusion, first of all, at the expense of collusions which have not been sustained earlier. That is why in this research I try to show the method of assessment of LP effects on collusion sustainability. The evidences of LP efficiency should be:

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

(2) A decrease in collusion duration;

(3) A decrease in number of collusion in the low concentration industries;

**5 SOURCES OF DATA ON COLLUSION IN RUSSIA**

Article 11 of the law "On Protection of Competition" is applied to explicit and tacit collusions. So I have had to handle the proceedings (price-fixing, market sharing, bid-rigging and tender fixing) of Article 11 "On Protection of Competition" over the period of 2004-2011 to select collusions which were illegal in Russian antitrust legislation and would be illegal in the foreign practice. In spite of many infringements of Article 11 annually, only few of them are considered as explicit collusions. More precisely only 30 infringements were detected in the period 2004 -2011. The rest part of infringements of Article 11 are concerted practices. Detailed information about these agreements is presented in table 1 of Appendix 1.

On the other side, the new Law "On the Protection of Competition" (2006) restricted the possibility of using the statistics which had been prosecuted by the old law "On Competition and the Restriction of Monopolistic Activities in the Goods Market".

The data concerning collusions include characteristics of agreements, markets that can facilitate illegal practice. This corresponds with approach of Abert et al. (2006) who studied directly or indirectly the impact of LP on markets, but not on antimonopoly authorities. The structure of data includes 4 groups of variables: "the characteristics of collusion", "antitrust policy", "facilitating and self-enforcing techniques", and "market characteristics". The group "The characteristics of collusion" includes the information of collusion type, the number of participants, the type of market, the nature of infringement (price fixing, market sharing, bid rigging), the start and the end time of collusion. The end of collusion can depend on FAS, the courts, or the participants themselves. The group "Antitrust policy " is necessary to assess the introduction of LP and sanctions. Also, it is necessary to pay attention to the end of the collusion according to the changes in the enforcement of LP, namely whether the collusion ended before April 2007 or after July 2009, or between these dates. At the same time collusion can be detected due to FAS investigations and regardless to use of the Program. Sanctions are the primary instrument in the prevention of antitrust violations. In Russia the decision about the imposing of fine is made separately from the decision of accusation. First, the company must be found convicted, and then FAS separately makes the decision about the fine. However,  if the company challenges the decision about the guilt, the decision about the penalty is blocked procedurally. Until the company is challenging FAS decision, there is no point to make the decision about administrative fine. Therefore, the decision about the fine can be different in time (months, even years) from the main decision. Besides, FAS can make a decision not to impose fines. Other fact that also takes into account in the analysis of collusions, is the number of old cases (relating to the period before 2007). In that period there has been no penalty of company’s turnover yet. So I included the data about illegal agreements which have not been imposed by penalties according to decision of FAS yet. Also, I included the data about the agreements which have not been made decisions by FAS yet.

The group "Facilitating and self-enforcing techniques" is made to estimate the sustainability of collusion. Collusion participants often devise multipronged mechanisms to interact as instrument of punishment for cheating. Self-enforcing techniques include threats, information exchange, compensation schemes between collusion participants, and also a price-leader or a quantity-leader. The group "Market characteristics" includes variables: the market type (national, regional, local), market concentration, and the type of goods (final product, intermediate product or service).

Over the period of 2004 - 2011 the collusions were in such markets as: 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 can be considered highly concentrated; the match market can be considered as middle concentrated; the markets of financial services and industrial explosives can be considered as a low concentrated.

All over the world the markets of high concentration create significant restrictions for the new market participants. This fact demonstrates the dependence of competition on strategic firms cooperation. Ceteris paribus, the firms are more ready to restrict competition in the market of high concentration to receive the advantage of high prices or market share. High concentration facilitates the coordination of market behavior and makes the enforcement of collusion easier and more effective. It is also easier to track and punish those who deviate from the collusion in such markets.

The collusions harm customers by raising prices and restricting supply, thus making goods and services unavailable to some buyers and unnecessarily expensive for others. The type of conduct participants in collusion considered as the most serious infringement are price fixing, output restrictions, market sharing, collusive tenders. Most infringements described in the table 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 such markets were undertaken (Yakovlev and Demidova 2012).

Thus, there is a little doubt as to whether LP has an essential impact on collusion discoveries, and on the behavior of market participants.

**6 THE MAIN HYPOTHESES OF EMPIRICAL ANALYSIS**

In the econometric analysis I use two explained variables. One variable describes collusion 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”.* These variables are important because they really can affect the incentives to support collusion. So I try to show the assessment of LP effects on collusion sustainability. To prove efficiency of LP I test the hypothesis described in Table 2.

The independent variables in Table 2 are divided into 4 groups: agreement type, antimonopoly policy, market and industry characteristics, and actions of participants inside of collusion.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tab.2. Characteristic of independent variables** | | | | |
|  | **Variables** | |  | |
| Variables of "Agreement type" | *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 to fix quantitative quota, 0 otherwise; | |
| *Market sharing (MS)* | | 1 - if there is an agreement to undertake anticompetitive practice: to divide market geographically, to set the quantity of sales, the mix of goods or a composition of customers, 0 -otherwise; | |
| *Bid-rigging* (*BR*) | | 1- if there is an agreement to rig bids, 0 - otherwise; | |
| *Н1: The more competitors are involved in the collusion agreement the higher is the probability of application for leniency program by one of them* | | | | |
| Variables of «Antimonopoly policy» | *Leniency SR* **(***lpsr***)** | | 0 - if collusion ends before April 2007; 1- otherwise; | |
| *Leniency SR* 2 **(***lpsr2*) | | 0 - if collusion ends after April 2007 but before July 2009; 1 - if collusion ends after July 2009; | |
| *LeniencyLR* **(***lplr****)*** | | 0 - if a collusion formed before leniency program introduces in Russia for the first time; 1- otherwise; | |
| *Fine* | | Collusion fines per infringement, in rubles | |
| *Н2:* *After the reform of 2007 the number of participants in discovered conspiracies (with or without leniency applications) increases but after the reform of 2009 it decreases. The decrease of collusion participants can be as evidence of LP efficiency.*  *H3: After the reform of 2007 the collusion duration in discovered conspiracies (with or without leniency applications) increases but after the reform of 2009 it decreases. The decrease in collusion duration can be as evidence of LP efficiency.* | | | | |
| Variables of «Market structure» | | Wholesale & retail trade (*W&R*) | | 1- if the collusion formed in wholesale & retail trade markets, 0 - otherwise; |
| Primary materials (*PM*) | | 1 - if the collusion formed in primary material markets: milk, mineral coal, coal, 0 - otherwise; |
| Chemicals (*Chem*) | | 1 - if the collusion formed in the chemical market (in this research, caustic soda, liquid chlorine, industrial explosives), 0 -otherwise; |
| Machinery, equipment and metal products (*MEMP)* | | 1 if the collusion 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 the collusion formed in the transport service market, 0 - otherwise; |
| Consumer electronics (*Celec*) | | 1- if the collusion formed in the consumer electronics market, 0 -otherwise; |
| Other products and services (*OPS)* | | 1 - if the collusion formed in the markets of other products and services (security services, housing and utilities infrastructure, financial services, repair dredging work), 0 - otherwise; |
| *Н4:*  *Collusions are distorted in the low concentrating industries* | | | | |
| Variables of «Facilitating and self-enforcing techniques» | | Compensation (*COMP*) | | 1- if the members agreed on a compensation scheme; 0 -otherwise; |
| Threat (*TH*) | | 1- if the threat or coercion were used to induce participation in or compliance with an infringement; 0 - otherwise; |
| Information exchange (*INFEX*) | | 1 - if the information about price, quantity, customers, capacity, or sales was exchanged for monitoring purpose; 0 - otherwise; |
| Retaliation (*RET)* | | 1 - if the members agreed on retaliatory mechanisms; 0 -otherwise.  Retaliatory mechanisms would mean that within the collusion there are some mechanisms that punish any deviations from the collusion agreement; |
| Price leader *(PRL)* | | 1 - if a collusion member was a price or market leader; 0 -otherwise |
| Side arrangement *(SIDARR)* | | 1 - if the members had side arrangements (e.g., joint investment,  technology sharing, exchange of product); 0 - otherwise.  If the members of the collusion had any other cooperation, for example joint R&D projects in addition to the collusion agreement itself. |
| Ringleader *(RINLEAD)* | | 1 - if Federal Antimonopoly Service identified a ringleader; 0 - otherwise; |
| Recidivism(*RECDIV)* | | 0 - if all members are first-time offenders; 1 - if a member is recidivist; |
| *Н5:* *Control variables are introduced. And relevant hypothesis is that the number of participants in the conspiracies (as a measure of incentives to collude and therefore collusion stability) decreases if various mechanisms inside of collusion discipline its participants.* | | | | |

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

 (2)

The regression model Poisson's distribution is used to test the required dependence. In the Poisson’s model the probability of implementation of separate outcome  is modeled as follows:

 (3)

with . In spite of that,  (equidispersion) is a significant restriction of these models type, (Verbeek 2000). The parameters estimation received from the model per method of maximum likelihood is asymptotically normal.  is a row of model regressors ,  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 includes 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 robustness of the main results.

**7 RESULTS**

We received the regressions with results of LP effects on collusion detection. In the Table 3 and 4 I present the results of testing hypothesis (H2, H3). I estimate the dependent variable of participants “Firms” in discovered conspiracies from the variables of group “Antitrust policy”: *Leniency SR* (*lpsr*)**,** *Leniency SR* 2 (*lpsr2*), *Leniency LR* (*lplr)*, *Fine (logFine)* (Table 3)*.* Table 4 presents Poisson’s regression results when the dependent variable is collusion duration between market participants (*dur)* in the market for the period *t* expressed in months. I also estimate this control variable from the variables of group “Antitrust policy”: *Leniency SR* (*lpsr*)**,** *Leniency SR* 2 (*lpsr2*), *Leniency LR* (*lplr)*, *Fine (logFine).*

*Table 3.*

The results for control variable of collusion participants in discovered conspiracies in the condition of LP application

|  |  |  |  |
| --- | --- | --- | --- |
| Firms | Coef | Std. Err | Robust  Std. Err |
| logFine\* | -0.059\*\*\* | 0.007 | 0.018 |
| lpsr | 1.400\* | 0.203 | 0.333 |
| lpsr2 | -0.277\*\*\* | 0.118 | 0.266 |
| lplr | -1.279\* | 0.125 | 0.289 |
| constant | 2.582\* | 0.175 | 0.304 |
| Log likelihood = -117.121  Pseudo R2 = 0.465 | | | |

\*logFine=Fine

The estimates in Table 3 show that all coefficients are statistically significant at the 1 percent level for variables *logFine*  and *lpsr2*, at 10 percent level for variables *lpsr*  and *lplr*. All coefficients are as expected, except the coefficient of *lpsr.*  The introduction of LP in 2007 did not reduce the number of collusion participants. In terms of applied method the absence of evidence about LP's effect means that the program did not make a positive impact on prevention. Not only more stable collusions have remained (with small participants) in the market, but also less stable collusion (with big number of participants). A significant number of applications (500 in a year) for full or partial immunity from fines in exchange for disclosure of information regarding collusion does not mean that incentives to create cartels decrease. The negative meaning of coefficient *lpsr2* demonstrates positive effect of LP in 2009. The reform of LP in 2009 showed that agreements have colluded only with 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 collusions detected per six month for the period of 2004-2011 is described in Figure 4. Such dynamic of average number of collusions is very important to confirm the hypothesis about the impact of LP. We can see the increase of average number from 2004 to 2008 and after 2008 the decrease of this indicator. This is clearly an evidence of the collusion distortion, first of all the distortion of most not stable collusions in the terms of the applied method.

0

50

100

150

200

4.03

4.04

4.05

4.06

4.07

4.08

4.09

4.1

4.11

Average number of the firms in discovered conspiracies

average number of firms per

six month

Fig.4. 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)

Although fines are the primary instrument in the prevention of antitrust violations, the estimate shows the smallest coefficient of “Fine” (table 3) among other estimates of the 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 the collusion decreases. This is because the opportunity to be the first to receive full or partial immunity from fines reduces the incentives to support the collusion. 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.

To test hypothesis (H3), Table 4 presents the Poisson’s regression results when the dependent variable is collusion duration between market participants *dur* in the market for the period *t* expressed in months. All estimates are statistically significant at the 10 percent level and correspond to the expected ones that is the results confirm this hypothesis. After the reform of 2007 the collusion duration in discovered conspiracies (with or without leniency applications) increases but after the reform of 2009 it decreases. So after the reform of 2009 the decrease in collusion duration has been an evidence of LP efficiency. Although the estimate of “Fine” shows the smallest coefficient among other estimates of independent variables, this instrument creates a credible threat of being prosecuted and sanctioned.

*Table 4*

The results for control variable of collusion duration in the condition of LP application

|  |  |  |  |
| --- | --- | --- | --- |
| dur | Coef | Std. Err | Robust  Std. Err |
| logFine\* | -0.013\* | 0.005 | 0.012 |
| lpsr | 0.626\* | 0.120 | 0.547 |
| lpsr2 | -0.144\* | 0.096 | 0.215 |
| lplr | -1.779\* | 0.096 | 0.201 |
| \_constant | 3.756\* | 0.092 | 0.557 |
| Log likelihood = -174.947  Pseudo R2 = 0.5309 | | | |

\*logFine=Fine

Tables 5, 6, 7 show results for control variable “Firms” and for independent variables of groups: “Agreement type”, “Antimonopoly policy”, “Market structure”, "Facilitating and self-enforcing techniques" which includes various mechanisms inside of collusion. In Table 5 I present the results of testing the hypothesis (H1). The coefficient of *lpsr2* was not significant*.* The coefficients of variables *price fixing (pf)* and *bid rigging (br)* are significant. The analysis of decisions implemented by the competition authority provided evidence that between 2004-2011 most hard-core collusions were price-fixing and bid rigging. The negative meaning of coefficient *lplr* demonstrates the positive effect of LP especially for collusions formed before leniency program introduces in Russia for the first time. So I can confirm that the more competitors are involved in the collusion the higher is the probability of application for leniency program by one of them.

*Table 5*

The results for control variable of collusion participants in the condition of different infringements and application of LP

|  |  |  |  |
| --- | --- | --- | --- |
| firms | Coef | Std. Err | Robust  Std. Err |
| pf | 0.998\* | 0.284 | 0.340 |
| br | 0.853\* | 0.322 | 0.711 |
| lplr | -1.376\* | 0.140 | 0.364 |
| lpsr | 0.980\* | 0.208 | 0.386 |
| \_constant | 1.621\* | 0.322 | 0.468 |
| Log likelihood = -144.693  Pseudo R2 = 0.339 | | | |

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

In Table 6 I present the results of testing the hypothesis (H4). The estimates in this table have not been consistent with the presumptive evidence of LP efficiency that collusions are distorted in the low concentrating industries (table 6). Within our research I collected the information about collusions which have happened in the markets with different concentration level. The estimates of regression are negative and statistically significant at the 1 percent level for the consumer electronics market (*celec)*, at 5 percent level for the markets of cover sheets and aluminum alloys, the production and sale of cash registers, and transport equipment (*memp)*, at 10 percent level for the markets of products and services like security services, housing and utilities infrastructure, financial services, repair dredging work *(ops)*. So the regression results confirmed that in high concentrated and middle-concentration markets it was possible to observe a decrease of collusion practice because most of markets studied in this research have high or middle-concentration level.

*Table 6*

The results for control variable of collusion participants and variables of different market structures and application of LP

|  |  |  |  |
| --- | --- | --- | --- |
| firms | Coef | Std. Err | Robust  Std. Err |
| celec | -1.430\*\*\* | 0.598 | 0.468 |
| ops | -0.774\* | 0.439 | 0.486 |
| wr | -0.802\*\* | 0.407 | 0.351 |
| memp | -0.474\*\* | 0.395 | 0.217 |
| tr | -1.869\* | 0.708 | 0.347 |
| lplr | -1.895\* | 0.109 | 0.228 |
| lpsr | 1.228\* | 0.162 | 0.323 |
| \_constant | 3.889 | 0.429 | 0.494 |
| Log likelihood = -131.315  Pseudo R2 = 0.647 | | | |

The coefficient *lpsr2* is not significant.

Table 7 shows the results of hypothesis about various mechanisms inside of collusion. Number of participants in the conspiracies (as a measure of incentives to collude and therefore collusion stability) decreases if various mechanisms inside of collusion discipline its participants The coefficients of all variables are positive and statistically significant at the 1, 5 and 10 percent level except coefficients of *lpsr2*, *ret, sidarr.* Interestingly, the results provide support for the empirical evidences of Fraas and Greer (1977) that a set of such mechanisms can promote obvious and silent collusions in more adverse markets. So I confirm the hypothesis (Н5): “The number of participants in the conspiracies (as a measure of incentives to collude and therefore collusion stability) decreases if various mechanisms inside of collusion discipline its participants”.

*Table 7*

The results for control variable of collusion participants in the condition of "Facilitating and self-enforcing techniques" and application of LP

|  |  |  |  |
| --- | --- | --- | --- |
| firms | Coef | Std. Err | Robust  Std. Err |
| comp | 0.600\*\* | 0.264 | 0.307 |
| th | 2.215\*\*\* | 0.219 | 0.231 |
| infex | 0.872\*\*\* | 0.197 | 0.326 |
| prl | 1.630\*\*\* | 0.292 | 0.450 |
| rinlead | 0.538\* | 0.204 | 0.299 |
| lplr | -1.607\*\*\* | 0.243 | 0.304 |
| lpsr | 0.846\*\* | 0.234 | 0.381 |
| \_constant | 1.347 | 0.303 | 0.452 |
| Log likelihood = -88.648  Pseudo R2 = 0.595 | | | |

The coefficients *lpsr2*, *ret, sidarr* showed insignificant meaning.

**8 CONCLUSION**

Not all the versions of LP are equally effective in prevention of the collusion. Modern economics provide a long list of assumptions, under which leniency can destroy but not promote deterrence. However, there are versions of LP design that undermine deterrence for sure. Rule of full immunity for every application, introduced by 2007 edition of LP in Russia, supports incentives to commit to collusion, instead of refraining from illegal price fixing or market sharing. Recent edition of leniency that has been in place since 2009, in contrast, enhances profitability of deviation from collusion, making collusions unstable.

However, corrections of errors in legal design may not result in the improvement of anti-collusion policies in the short run, if there is an inertia of the expectations and incentives of market participants. Negative effects of errors in legal design are exaggerated by other weaknesses of anti-collusion policies. The most important for Russia are limited ability of competition authority to organize down-raids, and mistakes in the assessment of the impact on agreements on competition. The first is associated with low discoveries (Type II errors) and the second with false convictions (Type I errors). Both types of errors decrease deterrence effect and in turn limit the effectiveness of leniency.

Fortunately, empirical assessment of the outcomes of two versions of leniency program supports the conclusion of the effectiveness of this policy instrument (if correctly designed) even in the imperfect institutional environment. Using the number of participants in the discovered conspiracies as a measure of the effectiveness of antitrust provisions against collusions I prove that the recent version of the program enhances deterrence effect. The application of the program results in the shortened collusion duration (earlier deviation from collusion behavior) and decrease of the number of participants in collusions. The latter indicates that less stable agreements with higher number of participants do not commit to collude. Leniency program therefore results in fewer collusions by undermining in advance the group of potentially less stable agreements. In contrast, no respective effects are observed in 2007 edition of leniency program. Positive effects on deterrence are registered shortly after the improvement of the leniency program.

Empirical results have two important policy implications. First, progressive policy tools can be effective even in the environment that is highly imperfect. Second, the improvement of competition policy instruments brings positive results relatively quickly. Therefore, Russian experience encourages further efforts of competition authorities in transition and emerging economies to adopt the best practice from international competition policy.

Especially such experience is useful for countries with transition and emerging economies where the articles typically explain the legal changes in competition jurisdictions but not their effects. Though, as for Korea there are some estimations of LP effects. As a consequence of the leniency program, the Korea Fair Trade Commission's enforcement on cartels has become more effective.

So, even in the highly imperfect jurisdiction where the fight with collusions is very weak LP can have independent significant because LP impacts on the incentives of participants who are able to decrease collusion stability. The reason of this advantage is the independent significance of LP. If collusion has been already concluded, the size of sanctions does not make an impact on the interest to continue to participate in it. So, if the most part of developing countries will adopt LP, a political commitment to fight collusions is necessary for such program to be effective.

Appendix 1.

Table 1. Data of horizontal agreements

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | |
|  | *Market* | *Cartel duration (estimated)* | *Cartel membership* | *Total market share* | *Participation in leniency scheme* | *Imposed penalty* | | *Type of infringement* | | |
|  |  |  |  |  |  | *Рenalties,*  *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 | **-** | 276417 |  | **-** | **-** | **+** |
| 3 | food salt | 02.2010 – 01.2011 | 4 | n/a | *+*  one member | 366972 |  | *-* | *+* | *-* |
| 4 | cover plate and [aluminum alloy](http://www.multitran.ru/c/m.exe?t=5700232_1_2&ifp=1&s1=aluminum%25252520alloy) | 12.2008 - 12.2009 | 4 | n/a | - |  | *\** | - | + | - |
| 5 | forge coal | 10.2009 - 11.2010 | 9 | n/a | - | 17370031 |  | + | + | - |
| 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 | - | 9174 |  | + | - | - |
| 9 | industrial explosives | 01.2009- | 7 | small share, highly | - | 1131499 |  | + | - | - |
|  |  | 03.2009 |  | competitive market |  |  |  |  |  |  |
| 10 | snowmobiles | 02.2008-12.2008 | 3 | snowmobiles "Buran" и "Taiga" - 46% in 2008 | - | 152905 |  | + | + | - |
| 11 | financial services | 01.2003 – 04.2008 | 51 | n/a | - |  | *\** | + | - | - |
| 12 | milk products, [mayonnaise](http://www.multitran.ru/c/m.exe?&s=mayonnaise&l1=1&l2=2), margarine | - | 2 | 99% | - | 4789 |  | + | - | - |
| 13 | liquid chlorine | 01.2008- 01. 2010 | 11 | members’ shares in the market 47,9%, 19,2%, 14,3%, 8,6%, 10%. | +  5 members |  | *\** | + | + | - |
| 14 | [cash register equipment](http://www.multitran.ru/c/m.exe?t=4671435_1_2&ifp=1&s1=cash%25252520register%25252520equipment) (production and sales) | 10.2008 - 12.2010 | 4 | n/a | - | 48393 |  | + | + | - |
| 15 | caustic soda | 01.2006- 12.2010 | 23 | Total share of sale was in 2006-2010 years 77,2%-62,5% | - | 28577982 |  | + | + | - |
| 16 | wholesale fruit and vegetables (Moscow region) | 07.2008  07. 2009 | 4 | n/a | - | 160803 |  | - | - | + |
| 17 | safety control system service | 03.2010-05.2010 | 7 | n/a | - | 242345 |  | - | - | + |
| 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 | - | 70735 |  | + | - | - |
| 21 | matches | 8 years | 8 | more than 90 % | +  all members |  | \* | + | - | - |
| 22 | cash register equipment | 05.2009-09.2009 | 6 | n/a | +  all members |  | \* | - | + | - |
| 23 | potash chloride | 12.2008-06.2009 | 3 | 50% | - | 8091651 |  | + | - | - |
| 24 | [cash register equipment](http://www.multitran.ru/c/m.exe?t=4671435_1_2&ifp=1&s1=cash%25252520register%25252520equipment) | one year | 4 | n/a | - | 12232 |  | + | - | - |
| 25 | taxi services | 03.2010- 05.2010 | 9 | n/a | +  one member | 3670 |  | + | - | - |
| 26 | gas service ([the Republic of Bashkortostan](http://www.multitran.ru/c/m.exe?t=3674032_1_2&s1=the%25252520Republic%25252520of%25252520Bashkortostan)) | 06.2007- 12.2007 | 2 | more than 35 percent | - | 42487 |  | - | + | - |
| 27 | [soft cable compound](http://www.multitran.ru/c/m.exe?t=1921997_1_2&ifp=1&s1=soft%25252520cable%25252520compound) | 11.2004-12.2005 | 21 | n/a | - |  | \* | + | + | - |
| 28 | thermal energy (Perm) | 01.2008 - 10.2008 | 2 | n/a | - | 1817766 |  | + | + | - |
| 29 | milk products | n/a | 4 | n/a | +  all members | 4183 |  | - | + | - |
| 30 | construction (Perm region) | 06. 2008 | 2 | 50% | +  one member | 133285 |  | - | - | + |

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   [↑](#footnote-ref-2)
2. <http://fas.gov.ru/about/list-of-reports/list-of-reports_30092.html> [↑](#footnote-ref-3)
3. <http://fas.gov.ru/about/list-of-reports/list-of-reports_30092.html> [↑](#footnote-ref-4)