

# ***Collusion in Repeated Game: The Issue and the Suggested Combating Strategy for International Cartel***

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**Abstract:** The international cartel does not positively influence the world's economy. It is inefficient to allocate resources by setting a very high price. This paper emphasizes one of the most famous examples of international cartels in the real world - OPEC and a possible international cartel in the future - GECF. Finding out the damages brought by OPEC and GECF, and the predicted damages brought by GECF in the future, highlight the negative impact it brings to call for governments' attention on the cartel. Then, making some comparisons of OPEC and GECF will help to make different target strategies for them. Also, this paper provides some suggestions to combat international cartels, like standardizing the cartel's definition and constructing a global jurisdiction organization to solve the cartel problems. Although there is a long way to go in combating international cartels, some actions are needed urgently to witness the increasing power of international cartels.

**Keywords:** collusion, OPEC, GECF, international cartel, law

## **1. Introduction**

The investigation of behavior in long-term interactions as opposed to one-time circumstances is the emphasis of the theory of repeated games [1]. When the game is repeated in the finite rounds, it is impossible to get the cooperation outcome without any other interference. In the last round of a finitely repeated game, both players know it is the last period and there is no further payoff for choosing to cooperate. Hence, they choose defect to maximize the payoff in the last round. Then, if both players are rational with complete information, after backward induction, both players choose the defect action in every round. Unlike finitely repeated games, the cooperation outcome does exist in infinitely repeated games when players' total payoff of cooperation is larger than the total payoff of defecting. In real life, the cooperation between firms is called collusion. This paper emphasizes analyzing one type of collusion outcome - international cartel.

The collusion outcome can largely increase the payoff for both firms by some agreements to maintain low production and high price, but it shrinks consumer surplus largely and creates deadweight loss, which makes markets very inefficient. Similar to international cartels, it harms consumers worldwide and other entities. Anna Vladimirovna Danilovskaia states in her paper that international cartels negatively impact most nations' economies. They have an impact on customers worldwide as well as the interests of rival businesses and other economic organizations. There are currently no binding international agreements in place to safeguard the benefits of businesses and consumers from international cartels. The current rules that correlate with international cartels

operating under the auspices of the UN, WTO, OECD, ISS, and other organizations are suggestions rather than enforcement. Investigations into cartels face many challenges because no comprehensive international law against them would apply to all nations suffering from international cartels [2]. National laws focus more on domestic collusion, and although the law for domestic collusion is also incomplete, the international cartel is even more out of the jurisdiction.

One of the most common examples is that global oil scarcity is an illusion in the current era. This can be attributed to one of the largest international cartels - the Organization of Petroleum Exporting Countries (OPEC). OPEC members signed an agreement to set a quota on oil production to create excess demand for oil and raise the price to maximize their payoff. According to the research from Brémond, Vincent, Emmanuel Hache, and Valerie Mignon, several causality tests, including time series data and panel data, demonstrate how OPEC's influence has changed over time in response to adjustments in the oil pricing structure. This study's analysis demonstrates that OPEC collaborates as a cartel with a subset of its members [3]. Subsequently, this global oil scarcity is a utopia created by OPEC in order to increase the oil price. It harms consumers and economic entities, even many countries' economies worldwide.

The Gas Exporting Countries Forum (GECF) is another example of a cartel. According to S.A. Gabriel, K.E. Rosendahl, Ruud Egging, HG Avetisyan, and S. Siddiqui, they predicted that a more mature gas market as a result of lower transportation costs of gasses would raise profits and hence increase the chance of forming a gas-OPEC. Additionally, GECF tend to become more akin to "gas-OPEC" with more members and cheaper transit costs, which would undoubtedly boost the effectiveness of coordinated supply cuts [4]. In the future, GECF can create an illusion of "global gas scarcity" to increase global gas prices.

Most countries suffer from international cartels for a long time, but a single country is weak before an international cartel. These countries are aware of the loss brought by collusion. Hence, they make relatively strict laws to regulate domestic firms' collusion under oligopolies and duopolies. However, they are not able to regulate international cartels. This causes an awkward situation, and domestic collisions have been regulated more than international cartels, even though the latter is far more harmful. Mical S. Gal's analysis calls for a re-evaluation of most jurisdictions' capacity to combat international cartels and recommends the adoption of a tool that would allow domestic prosecutors to base on foreign judgments regarding the presence of an international cartel and the scale of its operations, which would be an efficient way to combat international cartels [5].

Most scholars mainly emphasize analyzing OPEC and GECF separately, for example, whether OPEC is a cartel and whether GECF will be a cartel. Few scholars have compared these two organizations and their suggestions to combat international cartels. This paper will first outline the information of both OPEC and GECF, including the intention that they form, some of their history, the members in these organizations, how they collude in a repeated game, and the harm each organization brings. Then, compare these two organizations and make several theoretically practical optimization strategies.

## 2. OPEC

Iraq, Kuwait, Saudi Arabia, and Venezuela created the Organization of the Petroleum Exporting Countries (OPEC) at the Baghdad Conference on September 10–14, 1960 [6]. OPEC has thirteen members, including Algeria, Angola, Equatorial Guinea, Gabon, Iran, Iraq, Kuwait, Libya, Nigeria, the Republic of the Congo, Saudi Arabia, the United Arab Emirates, and Venezuela [7].

OPEC publicly states its mission is to maintain oil market stability and consort each member country's oil policy to provide consumers a stable supply of petroleum, producers a stable payoff, and investors a fair return on their investment in the oil market [6]. However, instead of providing a healthy oil market, OPEC uses quotas to manipulate the price of oil. According to the OPEC Annual

Statistical Bulletin 2022, 80.4% (1,241.82 billion barrels) of the world's proven oil reserves are in OPEC Member Countries [8]. This ensures OPEC colludes because each member in OPEC has credible threats: each of them is able to increase production at any time, so if any member

overproduces, they can make the excess production of oil flow into the market, which decreases the price and further decreases every member's profit as a punishment. However, cheating appears very normal among OPEC members, even if each has credible threats. According to Sel Dibooglu's research, when oil prices rise, most OPEC members react differently than when they fall. Regardless of the path actual oil prices take in the medium to long term, most members overproduce to hedge the risk of profit decline brought by shocks of average historical scale. However, when there is too much cheating, Saudi Arabia produces excess, following the 'tit-for-tat' strategy [9]. According to Figure 1 below, the Brent crude oil price increased dramatically from 2000 to 2007. Then, the price became much higher than before but with many fluctuations, which is analogous to Sel Dibooglu's finding. These fluctuations in the graph below show many cheat actions among OPEC members; otherwise, the price of Brent crude oil would be flatter, but this fluctuation could also be caused by market demand change and bargaining between OPEC nations and non-OPEC nations. These big fluctuations after 2005 are also inconsistent with OPEC's "intention" - Providing a stable, fair, and healthy oil market.

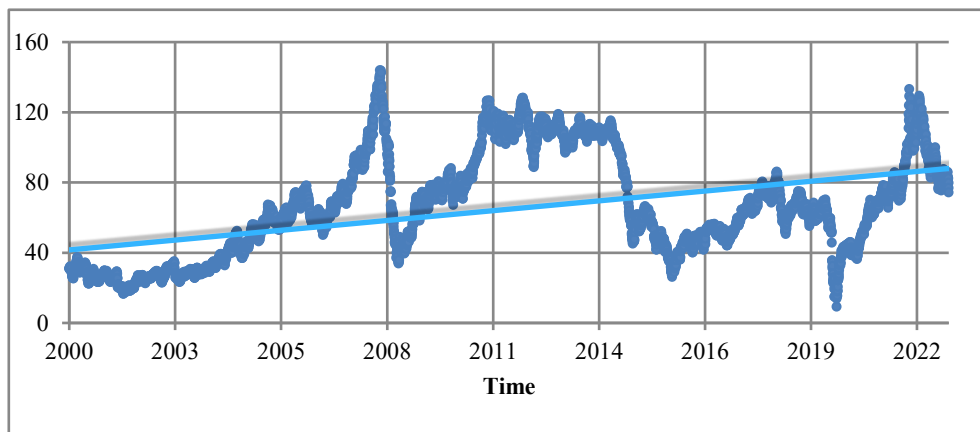


Figure 1: Crude Oil Price: Brent [10].

OPEC is basically a Brent oil price manipulator based on the above research and analysis. It is an international cartel, for sure. More importantly, Brent Oil is a widely used energy source, motivating many economic activities and trades. Such a high and unstable oil price will not flourish the world's economy.

### 3. GECF

Similarly, the purpose of the Gas Exporting Countries Forum also sounds very high-minded: GECF aims to promote the Member Countries' sovereign rights over their natural gas resources and to assist global sustainable development and energy security, become a worldwide advocate for natural gas and a forum for collaboration and conversation [11]. Primarily, the governments of Algeria, Brunei, Indonesia, Iran, Malaysia, Oman, Qatar, Russia, Turkmenistan, and Norway founded the Gas Exporting Countries Forum as a forum on May 19–20, 2001, during the first ministerial meeting held in Tehran, Islamic Republic of Iran [12].

GECF was established much later than OPEC, and it has not had a chance to form a cartel, but many convincing research predictions suggest GECF would be a gas-OPEC in the near future. Gas is more environmentally friendly by emitting less greenhouse gasses while burning; it is a cleaner fuel.

Therefore, natural gas has become increasingly important since people are now aware of the importance of environmental protection rather than the speed of industrialization. The consumption of natural gas experienced a considerable increase every year. If this trend remains, the utopia of “natural gas scarcity” is not far.

High transportation costs are A major obstacle preventing GECF from becoming a gas-OPEC. This transportation cost will be solved as the demand for natural gas increases. When natural gas is widespread enough, natural gas consumption becomes very high, and the average transportation cost will be very low.

According to S.A. Gabriel, K.E. Rosendahl, Ruud Egging, HG Avetisyan, and S. Siddiqui’s prediction, the consequences are serious in the worst-case scenario, where GECF, the Caspian, and the Middle Eastern nations all join together to establish a cartel. According to the prediction, in 2030, the impacts of this supra-GECF cartel will cause Europe to see an increase of \$3.69 per million BTU or \$91.4 billion in lost consumer surplus [4].

From Figure 2 below, it is easy to observe that the price of natural gas has become ridiculously high in recent years compared to the past decade. Without further detailed data, it is imprudent to state there is causality between such a high gas price and GECF collude; the tension between Russia and Ukraine can also be a factor in having a high natural gas price, but this high price of natural gas may hint GECF already found a method to collude.

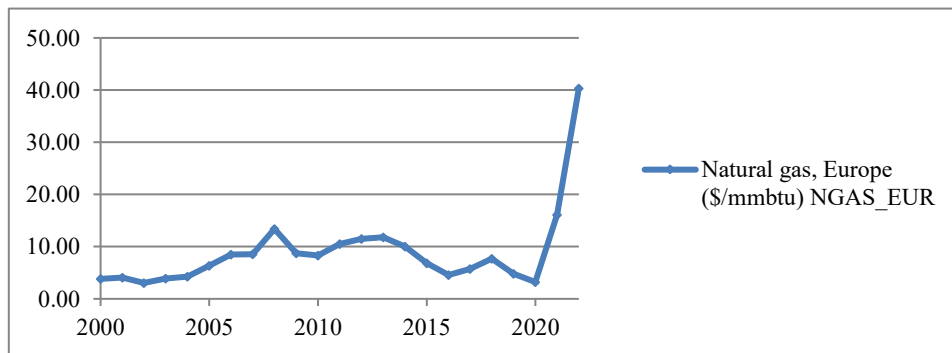


Figure 2: Natural gas, Europe (\$/MMBtu) [13].

Considering the above prediction, the consequence could be catastrophic if no action is taken to prevent GECF from becoming a cartel. This huge loss definitely hit the world’s economy.

## 4. Comparison Between OPEC and GECF

### 4.1. The Similarity

OPEC and GECF are fundamentally similar organizations. Both aim to provide an information exchange platform for all members, coordination, and rationalization each member country’s policies to maintain a healthy oil and gas market.

Both OPEC and GECF can influence the total oil and natural gas supply, respectively. These two energies almost occupy the whole energy market. Despite coal also occupying a considerable part of the energy source, it gradually has been despeled as people are more concerned about environmental issues. This means both OPEC and GECF hold considerable power to manipulate the energy market.

## 4.2. The Difference

By using quotas for its members, OPEC, referred to as a cartel, frequently tries to affect the price of oil worldwide. Based on OPEC's production goals, the quotas can motivate members to reduce or raise output.

Despite being the most powerful member of GECF - Russia argues that GECF does not have ambitions to emerge as a gas-OPEC. It is true that the GECF has not signed any agreements on quotas and has not yet imposed quotas on its members, and its charter does not contain any clauses that would allow it to impose quotas on its members. However, on July 16, 2018, Putin suggested that the United States and Russia, two big natural gas, should work together to manage natural gas prices during a joint news conference with Trump [14]. This shows the ambitions of Russia. Russia is the most powerful member of the GECF and definitely has some power to manipulate a considerable portion of the GECF.

Some limitations on GECF prevent GECF from acting as a gas-OPEC. First, It is impossible to fully globalize natural gas since natural gas is more like a kind of regional good, and regional pricing differs. Due to the high cost of long-distance natural gas transportation, most of it is used locally or close to the area where it has been produced. In areas where gas is harder to access, it is more expensive, and vice versa. It is necessary to liquefy natural gas before it can be transported to markets that pipelines cannot reach, such as between North America and Europe. Gas must be cooled to -260°F and stored in specially designed tanks in order to be converted to LNG, which reduces the volume by almost 600 times. The price of imported LNG in various markets is mostly determined by the expenses of liquefying and transporting natural gas as LNG. The cost of imported LNG in a market is further influenced by storage capacity, regional and seasonal demand levels, and other variables. Price spikes in the natural gas market are frequently isolated to a particular region, unlike the oil market, where oil price rises typically affect all regions. Cutting output in one market does not ensure better pricing in another due to variations in the price of natural gas between markets [14], which could possibly leave some room for price discrimination.

Second, most of the natural gas trade is with a 20-year long-term supply contract; since LNG transportation requires a very high cost, natural gas producers do not want the trade to stop in the short term, like 1 year or 2 years. Although natural gas trade increases dramatically as natural gas becomes more important, most natural gas trades still come with a 20-year-long contract [14].

## 4.3. The Problems Come with International Cartel

International Cartels like OPEC can do price manipulation for profit maximization. For instance, in the first half of 2018, the global oil supply glut ended after OPEC lowered its members' output quota [14]. In order to remain at a higher price of oil, Känzig, Diego R. used OPEC organization characteristics and high-frequency data to analyze: when there is negative news of oil, oil prices rise immediately, output gradually declines, and stocks rise. The US economy is affected by decreased activity, rising prices and inflation expectations, and depreciation currency, which shows that supply expectations of oil can bring strong negative macroeconomic influence [15]. This research on the US can also indicate the influence that OPEC can bring to other countries since oil is such a widely used energy source. Although oil shows a diminishing trend nowadays, it still occupies a considerable portion of the energy market.

The specialty of natural gas - regional goods leaves room for price discrimination. Under proper research of each area that uses natural gas, it is possible to estimate a profit maximization price in different areas. For instance, the natural gas profit maximization price in North America tends to be lower since natural gas is easy to access in this area. Then, selling more quantity at lower prices in North America would be the profit maximization strategy. The profit maximization price of natural

gas in Japan would be the opposite in North America since Japan does not have pipelines connected to any countries that produce natural gas. Japan solely relies on liquefying and transporting natural gas as LNG. Hence, selling less quantity at a higher price in Japan would be the profit maximization strategy.

Moreover, cartels are always difficult to observe since it is impossible to observe a cartel's hidden strategies or agreements in detail. Also, the definition and evidence for the cartel varies in different nations' jurisdictions.

For developing nations, examining global cartels is particularly challenging. The information in developed nations' public declarations regarding their involvement in the investigations of worldwide cartels is not relevant to other nations, which are compelled to conduct independent investigations into the impact of international cartels on their markets. Due to the lack of standard legislation governing collaboration, these nations will have issues that seriously impede investigations [16].

Recovering the damages, the cartel caused to the economic entities is a challenge related to international cartel investigations. In various national courts, litigants experience difficulties with complicated jurisdictions, choices of law, and procedural issues [16].

It is impossible to solve all the obstacles to combat international cartels since not all nation's laws about the cartel are identical, and the evidence of the cartel sometimes links to very sensitive knowledge of a nation.

## 5. Suggestion for International Cartel

Standardize the definition of the cartel in international law to prevent international cartels from escaping punishment by making different target strategies in different countries. By making it easier for claimants to obtain this information, the institutionalized interactions between antitrust and law enforcement entities that exchange information can be a solvent for repairing the harm caused by cartels. Based on this agreement, a specialized judicial organization that able to hear collective lawsuits for recouping damages from global cartels must also be developed. Respect the interests of claimants in lawsuits to recover damages caused by international cartels. Respect the interests of all the countries involved with the cartel investigation by unifying their efforts [16].

Cooperation and honesty are needed when investigating the international cartel. Nations should unify their information and make an effort to combat the international cartel rather than hide information and provide a negative attitude when some country seeks help. For instance, to prevent GECF from using price discrimination to claim a larger payoff, countries should cooperate, unify their evidence on price discrimination, and repair the loss brought by the international cartel by collective suits.

Globalization is also an element that increases the influence of international cartels. Hence, de-globalization can also be a solvent of international cartels. However, de-globalization also harms the world's economy. There should be a trade-off between the damage brought by de-globalization and international cartels.

## 6. Conclusion

In conclusion, international cartels definitely damage the world's economy by making very large deadweight losses. According to the above analysis, the influence of international cartels has increased dramatically in recent years. No matter how the countries in the international cartel shade their ambitions, it is undeniable that they are more and more powerful. Taking some actions to combat international cartels is urgently needed to prevent the price of energy from becoming ridiculously high. Although it is impossible to completely solve the international cartel problem since it requires all countries that suffer from cartel put aside prejudices and become very united, some actions are

needed, like standardizing the definition of cartel and constructing a global jurisdiction organization to solve the cartel problems.

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