

Gas and Oil Cartels: A Game-theoretic Analysis

Songying Fang
Department of Political Science

Amy Jaffe
Baker Institute

Ted Temzelides
Department of Economics

Rice University
December, 2011

Questions

- ▶ Could we see a gas cartel emerge in the near future?
- ▶ Moreover, will the major oil and gas producers collude across the oil and gas markets?
- ▶ How will the answers change as a result of recent political development in the ME?

Gas cartel

Why are the questions relevant?

- ▶ There are only a small number of major producers in oil and gas;
- ▶ The oil prices have been going up;
- ▶ Russia seems to have an incentive to form a gas cartel:
 - ◇ Currently facing competition from Qatar on the gas market;
 - ◇ Can be squeezed on the oil market by Saudi Arabia.

Modeling challenges

- ▶ Need to consider both economic and **geopolitical** payoffs for the countries in different scenarios:
 - ◇ Economic payoffs (costs or benefits);
 - ◇ Geopolitical payoffs – How will a cartel affect Qatar and Saudi's relationships with the US, or their standing in the region/world?
- ▶ The two markets are interconnected.

Our approach: game-theoretic analysis

- ▶ The players (countries) are rational; they do their best to advance their interests;
- ▶ The players maximize their **total** payoffs, taking into account both economic and geopolitical components;
- ▶ **Equilibrium (stable) outcome**: If one of the actors is better off from a different arrangement than forming a particular cartel, then we predict the cartel cannot be formed.

Model

- ▶ There are three players: R , Q , and S :
 - ◇ R is a player in both oil and gas markets: R_O, R_G ;
 - ◇ Q is a player in the gas market;
 - ◇ S is a player in the oil market.
- ▶ We enumerate all possible coalitions that can be formed in the two markets;
- ▶ We eliminate the coalitions that are not stable (not an equilibrium);
- ▶ Thus, we answer the questions raised by examining whether a gas cartel is a stable outcome.

All possible outcomes

1. Status quo: $\{R_O, R_G\}$, $\{S\}$, and $\{Q\}$;
2. $\{R_O, S\}$, $\{R_G, Q\}$: two cartels in both markets;
3. $\{R_O, S\}$, $\{R_G\}$, $\{Q\}$: Russia forms a coalition with Saudi on oil;
4. $\{R_O\}$, $\{S\}$, $\{R_G, Q\}$: Russia forms a cartel with Qatar on gas;
5. $\{R_O, R_G\}$, $\{S, Q\}$: Russia is alone; Saudi and Qatar form a coalition over both oil and gas;
6. $\{R_O, R_G, S, Q\}$: Grand coalition over both oil and gas.

Non-stable outcomes

- ▶ Outcomes require collusion between Russia and Saudi are not stable; Saudi is better off going it alone because:
 - ◇ Has to share the power of setting oil price with Russia;
 - ◇ Risks losing special relationship with the US;
 - ◇ Consumer countries may move away from oil to gas.
- ▶ The outcome in which Saudi and Qatar form a coalition is not stable; Qatar is better off going it alone because:
 - ◇ Gives Saudi more power to interfere in Qatar's internal affairs and block its regional interests;
 - ◇ Its power as an independent gas supplier is diluted.

Stable outcomes

1. Status quo: $\{R_O, R_G\}$, $\{S\}$, and $\{Q\}$;
2. Gas cartel between Russia and Qatar: $\{R_O\}$, $\{S\}$, $\{R_G, Q\}$;
3. Grand coalition: $\{R_O, R_G, S, Q\}$.

A closer look: gas cartel unlikely

1. Russia forms a cartel with Qatar on gas:

- ◇ Having both resources, Russia will have an incentive to use the cartel to advance its *overall* interests;
- ◇ Qatar will be constrained on the gas market;
- ◇ Qatar weakened geopolitically by losing its special relationship with the US.

2. Grand coalition over both oil and gas:

- ◇ Saudi is doing well with oil; additional economic gains are relatively small compared with geopolitical costs;
- ◇ Qatar cannot gain much more leverage on gas by having the cartel because there is an over-supply of gas in the world already; it risks losing special relationship with the US.

Price wars?

In principle, all three can wage price wars, but

- ▶ Saudi was successful at waging a price war against Russia in the 80s, but today's Russia is no longer an easy target.
- ▶ Qatar is already producing gas at a zero cost, and the status quo in the gas market is in effect a price war against Russia, which pushes Russia towards forming a gas cartel.
- ▶ Russia is constrained by domestic policies and cannot increase productions quickly; but if it removes domestic constraints, it is capable of waging the price wars.

The Implications of the Democratization of the ME

- ▶ Key to our analysis is the geopolitical payoffs of Saudi and Qatar, which might dominate their economic payoffs.
 - ▶ The geopolitical payoffs are largely derived from their relationships with the US.
 - ▶ Democratization will decrease the US influence in the region.
 - ◊ Hostile democratically elected governments in the ME.
- But more importantly,

But more importantly...

- ▶ A democracy requires a larger proportion of the population to support the regime;
- ▶ The government's policy has to make more people happy; thus has to pay more attention to economic payoffs than before.
- ▶ If Saudi is democratized, then it will be less capable of making concessions on the oil prices in return for US protection.
- ▶ But even if Saudi is not fully democratized, as long as the ruling class has to pay attention to the demands of the population due to the recent political turmoil, the same logic applies.

Conclusion

- ▶ Oil-for-security relationship explains Russia's failure to strike new energy coalitions thus far.
- ▶ Under the status quo, price wars in oil and gas unlikely;
- ▶ Given time, the political development in the ME has a potential to change the status quo, even leading to a Saudi-Russia coalition. A gas cartel is less likely.