

New alignments and the security of supply in the EU countries: investigating the role of Russia and Iran with a game theoretic approach

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Overview

The widening gap between EU gas production and consumption may require an 87% increase of import volumes between 2006 and 2030, and there are great uncertainties regarding the amounts of gas that can be expected from new suppliers. The potential of increased production from Norway and Algeria is limited; hence, Russia is likely to play a crucial part of meeting the anticipated growing gas demand of the EU. However the major producing Russian gas fields are in decline and EU shall resort to other alternatives such as Iran. But according to Fang and et al (2014) the new geopolitical alignments forming in the region may change the situation.

We study the policy of Russia and Iran in participating in new cartels to address that's impact on energy supply in EU countries. The major players of this study are Russia (R), Iran (I), Saudi Arabia (S), Qatar (Q) and China (CH). Each of these two players (R and I) has 16 options to choose. But initially some of these coalitions are put away as of some constraints. For instance Iran does not participate in coalitions in which S is present, because of serious political problems they have. Other constraints are as follow:

S and Q; as the different positions each of them has in energy market. In other words S is a major oil producer and Q is a major gas producer and there isn't enough incentive for them to cooperate with each other.

I and Q; because of different domestic conditions and different policy each of them has regarding to gas price.

So the remaining choices for Russia and Iran are as follow:

Strategies for Russia:

{R1: [R], R2: [R, I], R3: [R, S], R4:[R, Q], R5: [R, CH], R6: [R, I, CH], R7: [R, S, CH], R8: [R, Q, CH]}.

Strategies for Iran:

{I1: [I], I2: [I, R], I3: [I, CH], I4: [I, R, CH]}.

As mentioned above, for simplicity we only consider the role of Russia and Iran and their strategies. Using the "5-point scale" assessment, we consider the payoff of each players varies in the range of [-2, 2], such that -2 corresponds to very bad consequence and in contrast +2 corresponds to very good consequence. Then we search whether there is dominant strategy and Nash equilibrium or not. At last we address the impact of results on supply security in EU.

Methodology

The game designed in our study based on assumptions mentioned above is as follow:

		R							
		R1	R2	R3	R4	R5	R6	R7	R8
I	I1	(0,0)	(1,0)	(2,1)	(1,1)	(1,1)	(2,1)	(1,2)	(-1,2)
	I2	(-1,1)	(2,2)	(1,2)	(-1,2)	(-2,2)	(1,2)	(-1,2)	(-2,2)
	I3	(1,-1)	(2,-2)	(1,1)	(1,2)	(0,1)	(1,0)	(1,1)	(0,1)
	I4	(0,2)	(1,1)	(1,1)	(0,2)	(-1,2)	(2,2)	(0,2)	(-1,2)

Each element of this table is based on some analytical arguments which have been addressed in the paper. For instance I1R1 element, which relates to the status quo, shows that both of players are indifferent to remain alone in the energy market and compete with each other. Or I1R2 element relates to the case in which Russia is cooperating with Iran whereas Iran is cheating Russia and acts individually. In this situation at first Iran and Russia lower the oil and gas production in order to increase the price. Then Iran cheats the Russia and violates the allocated quota. At last the price would be on higher place for both player, but the production of Iran and Russia has been remained constant and decline respectively. So this result is good for Iran and indifferent for Russia (1, 0). Also the I2R4 corresponds to the situation in which Iran is cooperating with Russia whereas Russia is cheating Iran and cooperating with Qatar. That means Russia is using Iran and Qatar simultaneously and controls the oil and gas market strongly. Because of cooperating of Iran with Russia, Iran does not enter the EU market, and Russia with the

help of Qatar, increases its pressure on EU countries. In addition Russia by cooperating with Qatar can access to the open sea and increase its gas (LNG) exports. So this scenario is very good for Russia. But on the other hands this scenario is bad for Iran, because Russia is cheating Iran and cooperating with Qatar. So it can invest in North Dome in Qatar and cause some disturbance in South Pars development. Furthermore Iran by assuming himself as a partner of Russia does not enter the EU market. So the payoff of this scenario is (-1,2) for these two players. It should be mentioned that we consider the change in profit ($P*Q$) of players in the oil and gas market separately to evaluate their payoffs and we give more weight on oil market because the oil share in exchange revenue is very greater for both player and an increase in the price or quantity of oil cause a greater gain for them.

Results

We eliminate the sub-dominant strategies as follow:

I2 is sub-dominant regarding to I3 and is eliminated;

Then R2 is sub-dominant versus R1 and is eliminated;

Then R3 and R6 are sub-dominant versus R5 and are eliminated;

At last I4 and I1 are sub-dominant strategies versus I3 and are eliminated.

So the Nash equilibrium is unit and corresponds to I3R4, in which Iran is cooperating with China and Russia is cooperating with Qatar.

Conclusions

According to the results of this study we can investigate the new alignments in geopolitical conditions in the Middle East and its impact on energy supply in EU countries. The Nash equilibrium corresponds to the situation in which Iran is cooperating with China and Russia is cooperating with Qatar. So Iran can increase its market share in china and the East and South East countries of Asia. In addition Iran can develops the South Pars phases with the foreign investment of china and can be a free rider in the high price gas market which appeared by coalition of Russia and Qatar. Furthermore because of Iran's penetration in Chinsa market, Russia loses its share in china and inevitably it should increase its pressure on EU with the help of Qatar. But in contrast Iran has the incentive to enter the EU market and compete with Russia. Therefore we conclude that the significant strategy which EU can pursue is cooperating with Iran and participating in large projects like pipe line establishment or South Pars development to diversify its energy supply sources and mitigate the Russia's pressure.