China’s Telecommunications Market and Game Theory

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Abstract: China’s telecoms industry has been in a booming period since last decade and Chinese telecom firms have been started to reorganize in recent years. But it should not be neglected that there still exists excess competition, for instance ‘price war’ between different operators, which has negative influence on the development of the whole Chinese telecom market. In order to keep the quick pace of the telecom industry, it’s urgent task to find a way to adjust the relationship between the competitors in the process of competition and cooperation. Game theory as a theory or a methodology influences almost every aspect in competition. This paper will apply game theory to analyze the competition and cooperation between operators and try to find a measure to promote the competitive environment for China’s telecom firms.

Keywords: Game theory, Competition, Cooperation

1. INTRODUCTION

After China started to implement the economic reform policy in 1978, China’s telecommunication industry has been in a highly increasing period. The increasing rate of Chinese telecom operator’s revenue goes far beyond than that of GDP for quite a long time. The development of telecommunication not only meets the requirement of the market, but also pushes forward the development of manufacturing and other IT service sectors.

However, with the IT foam dissipating gradually, the global market of information industry is still in the low ebb. China’s telecommunication operators have been influenced too.
Though some areas, such as Internet and mobile phone, still keep growing at a quick pace. Yet the problems behind the development happened gradually: The Average Revenue Per User (ARPU) is decreasing even when the scale of the subscribers is increasing (see Figure 1), the excessive construction of the network and price war between operators. We can see that most of these problems come from excess competition between telecommunication operators, so that the very important thing we have to deal with is to refine the relationship between operators.

![Figure 1 ARPU of China Mobile and China Unicom 1999-2004](chart.png)

Source: China Mobile and China Unicom by author’s research, 2005

As a theory and an applicable methodology on competition, game theory focus on how to make a decision under different conditions, and its main goal is to avoid the conflict and to realize the impartiality through studying the interaction between different decision-makers. Because of its rational characteristics, game theory has been applied into the study of the marketing and competition. It is possible to apply this theory to analyze the China’s telecommunications market and investigate the countermeasure and strategy for Chinese telecom operators in order to realize the win-win for the competition and cooperation.

2. EXCESS COMPETITION IS NOT A GOOD CHOICE

There are about four main telecom operators in China’s telecommunication market up till now; there are China Telecom, China Mobile, China Netcom and China Unicom, which occupied the most market shares in Chinese telecom market. Because of the market shares and the characteristics of oligopoly, each operator has the ability to influence the market, especially the tariffs or the price.

It is easy to understand that Chinese telecom market is in the process of reformation because Chinese economy is in transformation from planned economy into market economy and China’s telecom firms have been reorganized to satisfy the requirements in recent years. It seems that it still needs time to do the market transformation. It is unavoidable that informal
or even illegal things happen when competition is to take effect because every operator
regards its competitor as the real enemy. Excess competition happened in Chinese telecom
market because telecom operator wishes to get more market share, such as launching the price
war, blocking the interconnection, or even destroying the rival’s communication facilities. As
a result from these excess competitions, the revenue and profit of telecom firms is in decline.
It seems that China’s telecom operators are getting into the classical model in game theory:
Prisoners’ Dilemma.

The hypothesis of Prisoners’ Dilemma is that two suspects were arrested, and they were
interrogated respectively in case of colluding. As table 1 show, the suspects were faced with
two choices: to confess or to remain silence. But they were told: if both of them confess, they
would be sentenced for 5 years and get early parole. If only one of them confess, the guy who
told the truth would be set free immediately, and the other guy would have to stay in jail for 8
years. Meanwhile, if both of them keep silence, they would be taken sentences for only 1 year.

Table 1
Prisoners’ Dilemma

<table>
<thead>
<tr>
<th>Prisoner A (year)</th>
<th>Confess</th>
<th>Silence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Confess</td>
<td>0, -8</td>
</tr>
<tr>
<td></td>
<td>Silence</td>
<td>-1, -1</td>
</tr>
</tbody>
</table>

A common view is that the puzzle illustrates a conflict between individual and group
rationality. Obviously, if both of suspects keep silence, they could only stay in jail for one
year, but this result can not satisfy the individual rationality because whatever his accomplice
does, the better choice of the suspect is confess. “A group whose members pursue rational
self-interest may all end up worse off than a group whose members act contrary to rational
self-interest. More generally, if the payoffs are not assumed to represent self-interest, a group
whose members rationally pursue any goals may all meet less success than if they have not
rationally pursued their goals individually.”

Excess competition such as price war between operators has the similarity with
Prisoners’ Dilemma. Table 2 shows a case of IP phone service.

From table 2, we can see that if both operators keep current price, they could get a profit
of 55 million RMB respectively. Meanwhile, If one of them discounts while the other makes
no response, the one who take action will get a profit of 73 million RMB and the other will
only get 10 million RMB. Furthermore, if both of them discount, they will get 30 million
RMB respectively. Whatever operator B does, the dominant strategy of A is discount like B
does. As a result, operators cut down the price of IP phone service, price war on IP phone

become more serious. The price of some IP cards such as China Unicom and China Netcom even discounted less than 60% of its whole tariff.

Another example happens in the market of mobile communication. China Mobile and China Unicom are the main operators in China’s mobile market and they compete each other. The price war between these two companies happened almost in every city in China, and the price of mobile service is even cheaper than fixed phone service in some cities.

From the analysis of Prisoners’ Dilemma and price war, we can get a conclusion that if operators compete with each other by promoting the quality of service and product rather than cut down the price, they can get more profits. But without a common agreement and compellent regulation, individual rationality will finally lead to the unconfidence. If it cannot be handle properly, Prisoners’ Dilemma will disturb the telecom market order of resulting in negative influence to both competitors.

3. COOPERATION IS A RATIONAL CHOICE

Since China Unicom entered into China’s telecom market, the monopoly of China Telecom started to be broken. After China Mobile and China Netcom was set up, the competitive situation of Chinese telecom market has been formed. Nevertheless, excess competition results in problems to the new companies such as interconnection.

Table 2
The Price War between Operators for IP Phone

<table>
<thead>
<tr>
<th>Operator A (million RMB)</th>
<th>Operator B (million RMB)</th>
<th>Discount</th>
<th>Not discount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discount</td>
<td>30, 30</td>
<td>73, 10</td>
<td></td>
</tr>
<tr>
<td>Not discount</td>
<td>10, 73</td>
<td>55, 55</td>
<td></td>
</tr>
</tbody>
</table>

Long time that customer complains about the interconnection between China Telecom, China Mobile and China Unicom: there are still many blocks between different networks. Take mobile network for example, China Unicom has occupied more than 35% of the whole market share, but there are still some interconnection problem with China Mobile, especially at some service such as CDMA and SMS. Even though it can beat the competitor to some degree, but it is not a rational choice, because interconnect problems will finally take effect on itself. Telecommunication services need the integrality of whole network. Therefore, cooperation is a rational choice.

Here we will utilize another model in game theory: the battle of the sexes game.

The hypothesis of this model is two lovers want to spend their Saturday afternoon together. Unfortunately, they dislike each other’s hobby. He wants to go to a football game, and she wants to attend a pop-concert. Table 3 will show this situation.
As the table shows, if they go out together, whether for the football game or the pop-concert, only one of them can be fully satisfied at the expense of the other. But if they both go to their own preferred event, they will miss each other and be dissatisfied. There are two dominant choices, to go to the football game together or to attend the concert together. In our daily life, to maximize the total profits, both sides always get to privities: football game this time and concert next time.

We can learn from the game that if there are common interests, cooperation between two competitors can sometimes be a rational choice, and as a result, the profits of both sides can be maximized. We also can take the interconnection between China Mobile and China Unicom for example, as table 4 represents.

Table 3
The battle of the sexes game

<table>
<thead>
<tr>
<th>Wife</th>
<th>Football game</th>
<th>Pop-concert</th>
</tr>
</thead>
<tbody>
<tr>
<td>Football game</td>
<td>1, 4</td>
<td>0, 0</td>
</tr>
<tr>
<td>Pop-concert</td>
<td>0, 0</td>
<td>4, 1</td>
</tr>
</tbody>
</table>

Table 4
The battle between two operators

<table>
<thead>
<tr>
<th>China Unicom</th>
<th>Fixed local network</th>
<th>SMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed local network</td>
<td>0.5, 1</td>
<td>0, 0</td>
</tr>
<tr>
<td>SMS</td>
<td>0, 0</td>
<td>0.3, 0.7</td>
</tr>
</tbody>
</table>

China Unicom has fixed network but does not realize interconnection with China Mobile, and the latter wants to exploit this area. Meanwhile, China Mobile has a relative strong network than China Unicom and the latter wants to realize better cooperation with the former in SMS service. Each operator has its own superior character, and cooperation is the dominant solution that can maximize each one’s profits. Therefore, when one operator appeals to the other for cooperation, and cooperation can be profitable, a better choice for the latter is to accept.
4. A FITTING ENVIRONMENT IS INTEGRANT

Actually, the models we mention above base on the Nash Equilibrium in game theory, and the main viewpoint of the analysis is to illustrate the cooperative competition can maximize the profits for both side. But it is a must that some kind of premises is established previously, the same model can lead to different results.

There are some necessary conditions as follow:

First of all, both sides have relative equality in competition. Return to the Prisoners’ Dilemma, the final result can be easily changed to (silence, confess) or (silence, silence) if one of them deceive the other, or one of them can get the perfect information while the other can not, or else, they were threaten by gangdom. The status of each side must be equal.

The situations of operators are different: different history, different kind of service, different level of revenue and different scale of network. It’s important that we should put both side of competition in a relative equal way when we consider the affairs of competition.

Second, the decision-maker, a human, a company, even a nation or a organization, should be rational. If both or one of the suspects was not a rational man, if they would rather to die than to betray his friend for personal loyalty, the equilibrium of the model could be easily broken, too.

Nowadays, some operators have not break away from the shadow of planned economy, their thoughts of competition are not rational enough. They simply take their competitors as real enemies, and there are no common interests at all, let along cooperation. In this situation, game theory will surely lose it foundation.

Third, it is important that there is a favorable environment for competition. In the model of Prisoners’ Dilemma, there should be an existing rule for suspects to follow, and the police should not interfere the suspect’s decision. China’s telecom industry is undergoing the process from the informal competition to the formal one. We can see that a favorable environment often leads to a booming industry, to the contrary, in a unfavorable environment, hostile competition and decline of the scale of the revenue happen from time to time.

During the course of this procedure, besides the internal facts of the operators, national policy should play an important role, too. First, By setting up correlative laws or regulations, and cultivate favorable environment for effective competition, the government should adjust the relationship between operators directly or indirectly. Second, with china’s entry to the WTO, the government should lead operators the adapt to the new condition, and boost the cooperation between domestic operators. Third, give necessary support to those relative small operators, make sure that they have the chance to negotiate with the bigger one, and realize the booming telecom market by promoting the rational competition and cooperation.

5. THE PROSPECT IS EXCITING

It’s crucial for China’s Telecom enterprise to study and use the competition theory such as economics and game theory, and to fully understand the consequence of maliciously
competition. The particularity of telecom industry requires cooperation, and only when they carry on extensive cooperation, expand market together, can they realize the win-win situation, and raise efficiency of both sides. If each one refuses to cooperate, does not hesitate to suppress rivals by sacrificing them, the whole market can not expand, and even worse, it can also cause overlapping investment, repeated construction, and the waste of resources.

After China Telecom was divided into north part and south part in 2002, the reformation of China’s telecom market entered a new stage. No operator holds the market share for more than 40%, and the foundation of fair play was strengthen. A new type of relationship was formed between operators, cooperative competition become the major mode in development. The government’s function is being transformed from the direct control of the enterprises into indirect adjustments. The competition environment is moving to maturity with the standardization of laws and regulations. The development prospect of the China’s telecom market is clear and exciting.

REFERENCE
