Research On Pricing Strategy Of Mobile Communication Resale Service In China Based On Bertrand Model

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Abstract

Virtual operators play an important role in stabilizing the competition in the telecommunications market and promoting the development of mobile communication. The virtual operators could obtain higher wholesale resale prices than the basic operators due to the follow-up failure of the basic operators’ retail prices adjustment, which brings virtual operators higher cost restricting their development seriously. This paper analyzes the pricing game between basic operators and virtual ones based on the Bertrand model. The result of collusion is that the price and the profit are all increase for both in comparison with make interests respectively. Basic operators have an incentive to maintain higher wholesale price, therefore government regulators must participate in the game. Based on the analysis results, the effective strategies for the development of mobile communication resale service in our country are put forward.

1 Introduction

The first 11 mobile virtual network operator (hereinafter referred to as virtual operator) licenses were issued in December 2013 following “Mobile Communications Resale Services Pilot Scheme” promulgated by MIIT (Ministry of Industry and Information Technology of the People’s Republic of China) dated January 8, 2013. A substantial first step has been made with private capital entering the telecoms industry for the first time. Virtual operator lists of the second batch to fifth batch have been released in March 2014. The wholesale resale prices of mobile communication resale services have been increasing for both in comparison with retail prices of basic operators.

Virtual operators need reasonable price disparities between wholesale price and retail price for virtual operators based on virtual operator licenses (hereinafter referred to as basic operators) to carry out vertical pricing strategy and promote the development of mobile communication resale in China and discuss the potentially effective strategies and methods for development of mobile communication resale based on game theory.

Pricing problems of mobile communication resale in China involves basic operators, virtual operators and government regulations bodies. It must inevitably impede the formation of effective competition in China’s telecom industry and reduce the efficiency of the problem can’t be solved suitably. There has been a lot of reforms and changes in the past twenty years, which have been analyzed by many scholars based on game theory. But most of them were based on traditional markets and game of basic operators instead of virtual ones. This article will analyze pricing strategy of mobile communication resale in China and discuss the potentially effective strategies and methods for development of mobile communication resale based on game theory.

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2 Current situation and problems of mobile communication resale services in China

2.1 Current situation of mobile communication resale services in China

Mobile communication resale service is the second category of basic telecommunications services. It refers to the service that the resale enterprises operate mobile communication services by using mobile communication networks owned by other telecommunication operators. The resale enterprises not only purchase mobile telecommunication services from the basic telecommunication operators but also operate their own mobile communication service systems. They can also build business support systems such as integrated service management system, billing system and operating system. The virtual operators in this article refer to resale enterprises of mobile communication service in China, namely MVNO (Mobile Virtual Network Operator).

The relevant data of Qianzhan Industry Research Institute showed the number of subscribers from virtual operators in China reached 20.5 million by the end of 2015, 39 of 42 resale enterprises obtaining licenses for pilot approval had officially begun their own resale service with 7 of 42 resale enterprises obtaining licenses for pilot approval having over 1 million users. The number of users of top ten resale enterprises accounts for about 86% of the total number of users from virtual operators in China.

Virtual operators play an important and positive role in stabilizing competitive pattern of communications market in our country and promoting the development of mobile communication service. Therefore, during this period of time virtual operators worked as competitors of the basic telecom operators to attract customers. The wholesale prices given by basic telecom operators are still high although data traffic wholesale price dropped from ¥0.14/MB to ¥0.10/MB under the resale mode of resell price structure. Therefore, it is not the advisable thing to do for the virtual operators to attract customers.

As you can see that tariff of the virtual operators lack price advantage compared with cheaper prices of local package of some basic telecom operators, which makes it difficult for virtual operators to attract customers. The wholesale prices given by basic telecom operators are still high although data traffic wholesale price dropped from ¥0.14/MB to ¥0.10/MB under the resale mode of resell price structure. Therefore, it is not the advisable thing to do for the virtual operators to attract customers.

2.2 Problems and reasons of mobile communication resale services in China

The fixed cost of virtual operators is much lower than basic telecom operators due to unnecessary network construction but they must pay heavy rental cost of telecom network, which leads to much higher variable cost part than construction but they must pay heavy rental cost of telecom network, which leads to much higher variable cost part than

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operators to obtain subscribers through low price strategy. Exaggerated publicity of cheap prices is bound to affect the long-term development of the virtual operators and even become the main reasons for users’ complaints for the virtual operators.

The sales revenue of virtual operators includes the mark on between wholesale and retail prices of mobile business, value-added incomes of data flow application and datamation, and the difference in voice services, and primary services. It’s the first thing to have enough retail price difference if virtual operators want to make profit at the beginning of operation. Whereas the basic telecom operators could carry out the strategy of vertical price squeeze for their own interests due to the characteristics of the vertical integration of telecommunication, namely basic telecom operators who control the upstream of the mobile communication network (wholesale part) and virtual operators in the downstream market (retail part) who rent the mobile network from basic operators in mobile voice, SMS, mobile data services [9]. The basic operators may increase wholesale price or virtual operators to squeeze the profits of competitors while keeping or reducing their own retail price in the market, which leads to the perplexing problem of limited or even negative mark on of virtual operators.

The three biggest operators have decreased the data low fee dramatically which leads to an urge change in retail price level due to the requirement of our country’s “speed acceleration and lower fee” and deteriorated competition in 4G industry of basic telecom operators. The basic operators haven’t changed the resale price accordingly although "MIIT's Guidance about wholesale price adjustment" has already placed clear the benchmarking and adjustment frequency of wholesale price which leads to the slower adjustment speed of virtual operators than the descend speed of basic telecom operators. That is why the marginal cost for per increased unit output are $C_1$, $C_2$, respectively [9]. Finally, suppose that basic operators and virtual operators make the decisions at the same time, and their respective strategy space is: $\{0, P_1\}$, $\{0, P_2\}$, $\{0, P_1, P_2\}$, and $\{0, P_1, P_2\}$, and their respective profit function is as below.

$$q_1 = d_1 (P_1, P_2) = a_1 - b_1 P_1 + d_1 P_2$$

$$q_2 = d_2 (P_1, P_2) = a_2 - b_2 P_2 + d_2 P_1$$

$$a_1, a_2, b_1, b_2, d_1, d_2 > 0, \quad a_1 \text{ and } a_2 \text{ show the consumers’ actual and potential demands; } b_1 \text{ and } b_2 \text{ show level sensitivity of consumers towards prices; } d_1 \text{ and } d_2 \text{ show substitution of a coefficient of a competitive product from two operators [8]}. To simplify the question, we suppose that there are fixed cost for both basic operators and virtual operators (telecom operators in China seldom consider the highest cost when decrease price.). We also suppose that the marginal cost for per increased unit output are $C_1$ and $C_2$ respectively [9]. Finally, suppose that basic operators and virtual operators make the decisions at the same time, namely only considering static game problem.

The two groups of players are basic operators and virtual operators in this game. Their respective strategy space is: $S_1 = [0, P_{1max}]$ and $S_2 = [0, P_{2max}]$. $P_{1max}$ and $P_{2max}$ are the highest price which can be sold on respectively by basic operators and virtual operators (i.e., the highest prices regulated by the government). The earnings for both players of the game income are their respective profits, denoted with $u_1$ and $u_2$ that are both price functions [9], namely:

$$u_1 = u_1 (P_1, P_2) = P_1 q_1 - P_1 C_1 q_1 = (P_1 - C_1) (a_1 - b_1 P_1 + d_1 P_2)$$

$$u_2 = u_2 (P_1, P_2) = P_2 q_2 - P_2 C_2 q_2 = (P_2 - C_2) (a_2 - b_2 P_2 + d_2 P_1)$$
Because both players realize they reduce the price but the other player keep the price high, which can arise itself. So their own market share and gain additional benefit; whereas it would lower market share and make profit. Therefore, both players would try to choose price to make benefit for themselves even if they would not neglect the competitors’ existence. It would make difference if consider the best result based on whole profit. We suppose the price that can make the maximum whole profit is $P = P_1 = P_2$. Therefore, both players would try to choose the price to make benefit for themselves, even if they would not neglect the competitors’ existence. It would make difference if consider the best result based on whole profit. We suppose the price that can make the maximum whole profit is $P = P_1 = P_2$, then whole profit is $U = PQ - CQ = (P - C)q_1 + q_2 = (P - C)(a_1 - b_1 P_1 + d_1 P_2 + a_2 - b_2 P_2 + d_2 P_1)$. If we make the derivative of $U$ equal to 0, then we can get the highest price $P^*$ for the maximum whole profit and $u_1^*, u_2^*$.

Suppose $a_1 = 11, a_2 = 8, b_1 = b_2 = 1, d_1 = d_2 = 0.5$, we would get different results with different assumed $C_1$ and $C_2$. The calculated results are shown in table below.

<table>
<thead>
<tr>
<th>independent decision</th>
<th>conspiracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>$P_1$</td>
<td>$P_2$</td>
</tr>
<tr>
<td>C1 = 1</td>
<td>7.7</td>
</tr>
<tr>
<td>C2 = 2</td>
<td>7.9</td>
</tr>
<tr>
<td>C1 = 1</td>
<td>8</td>
</tr>
<tr>
<td>C2 = 3</td>
<td>7.1</td>
</tr>
<tr>
<td>C1 = 0</td>
<td>7.2</td>
</tr>
<tr>
<td>C2 = 2</td>
<td>7.3</td>
</tr>
</tbody>
</table>

For basic operators, conspiracy can raise prices and increase profits in any way from the above data. For virtual operators, conspiracy can raise prices and increase profits only when the cost difference between the basic operators and virtual operators is significant.

It is the reality that there is the gigantic cost gap between virtual operators at the early stage of operation and basic operators having run the business for many years. Therefore, the basic operators and virtual operators can make higher profits respectively if they can cooperate and jointly decide the price than they do business under independent decisions scenario.
Such cooperation is certainly not easy because pricing combination and both p layers realize the result that they would make higher profits if they decrease price while the other player keep the price and vice versa. Therefore, both players would choose to lower the price till it reaches a new Nash equilibrium. The Bertrand Model may well explain the price war of mobile communication market in China.

From the above data can be seen that the higher g her cost difference between the basic operators and virtual operators, the closer the prices, the greater the difference in profits. Therefore, the basic operators have motivation to maintain high wholesale prices which makes higher cost for virtual operators.

It’s indispensible bringing regulator in game and increasing restraint and punishment for operators to curb the price war between basic operators and virtual operators, and competitive imitation behavior of basic operators, which can change the revenue function. For example, if \( u_1 = u_1 \)

\[
(P_1, P_2) = -k f(P_1), k \text{ is the penalty factor which can show the intensity of punishment by regulator towards violation. T herefore, the government should establish corresponding laws and regulations, increase the intensity of punishment for the vicious violations of price competition and setting up competitive barriers to achieve cooperation to some extent in or der to lead to benign development of coopetition.}
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4 The developmental strategy of mobile communication resale service in China

4.1 Regulators and operators cooperate co consultedly to curb the virulent price competition

Firstly, the basic telecom operators and virtual operators should realize the dangers of vicious price competition and establish rational management methodology. Under the market condition, the price competition has the obvious interaction, namely one part lower the prices and the other would also lower the prices to maintain the market share and a new cycle of depreciation would last accordingly that would ultimately lead to vicious competition of price-cutting spiral and loss at both sides as well as declined economic benefit continuously. While price competition is the appearances of the competition, the fundamental competitiveness of enterprises should be the product competition. The operators can satisfy consumers’ demand by focusing on products through business innovation and constant introduction of new services in the meanwhile by strengthening the enterprises’ ability through management innovation, cost-down, and efficiency improvement.

Secondly, the corresponding laws and regulations should be established to improve the efficiency of regulation. The price is the most concerned factor for consumers due to the developmental level of productivity. So, the existing operators with strong strength also tend to push aside new entrants by lowering prices (even below cost). According to the analysis above, the more powerful regulatory penalties, the higher the enterprises have in violation of lowering the price and the smaller space for price-cut. Therefore, it’s necessary to establish corresponding laws and regulations, reinforce the penalty intensity to curb the price competition of vicious price-cut and vertical price squeeze in order to avoid chaotic price competition.

4.2 Basic operators should keep a pen- minded viewpoint to promote the mobile communication resale service

Wholesale and retail price difference is the guarantee of the virtual operators’ development. The long-term mechanism to solve the problem has not been established although the three basic operators cut the wholesale price through different ways to alleviate the dispute of negative mark to some extent. The three basic operators should undertake more social responsibility, keep one nined and t hink about the issue in the long-run. Basic operators should cooperate with virtual operators actively to establish a benign business environment both for their own interests and social interests. Finally basic operators and virtual operators should adjust from being driven by policy to promoting the development of mobile communication service spontaneously and voluntarily to promote the development of mobile communication service.

4.3 Virtual operators should break away from low-price competition by innovation and being aggressive

Most virtual operators would a dopt a low-price strategy inevitably in the early stage of development to attract users according to the analysis above. For now, it depends on wholesale price provided by the basic operators whether the virtual operators can make profits to a large extent. The virtual operators may hardly make profits and would get into the infinite loop of vicious competition if they only rely on differences between wholesale and retail prices. So, in the era of mobile Internet, virtual operators don’t hope to profit directly from the mobile communication services but should focus on the development of users with reasonable tariff policy and other business portfolio. For example, they can provide more refined fee packages through the more thorough segmenting of market based on consumers’ features. They can also expand the scale and increase the value of data flow by innovative billing methods. And they can also integrate a large number of mobile terminals as traffic consumption ability and differences between the users of different types of mobile terminals. They can also integrate a large number of mobile terminals as traffic consumption ability and differences between the users of different types of mobile terminals.
number of services types and grades provide a richer business mix. And they can develop comprehensive service of voice, video, or data flow with lower price than products of basic operators. It’s not necessary for virtual operators to make profit on the mobile communications services but do it with improvement of the attractiveness and competitiveness for the core business. Using ingenuity, as a means to combine high-quality and mobile business orders in order to ultimately make profits as a whole.

4.4 Both Parties of Mobile Communication Resale Services Should Negotiate Further about Resale Price to Realize Actual Price Linkage

The price of mobile communication resale services is determined by both parties and relatively fixed in a certain period. This kind of price decision mechanism is lack of flexibility, especially when the basic telecom operators reduce retail price frequently. The wholesale price which virtual operators get is not actually lower than the retail price of basic operators, which makes the virtual operators losing price advantage and restricting their development. Simply rely on the monopoly price advantage wouldn’t improve the competitive ability of basic operators. In a long term, it doesn’t lead to the win-win situation if virtual operators can’t develop. Therefore, basic operators and virtual operators should make further negotiation to figure out the more flexible pricing mode.

There should be a certain gap between the wholesale prices of virtual operators and the retail prices of basic operators. The wholesale prices obtained by virtual operators should be adjusted accordingly while the retail prices of basic operators have changed dramatically that makes wholesale prices with real and dynamic adjustment mechanism. Therefore, negotiated prices can become floating prices to solve the problem of negative mark on.

5 Conclusion

Mobile communication resale services make private capital play an important role with the advantages of innovation and flexibility, satisfy the mobile users with the applicable requirement. Diversification, individuation and flexibility, especially when the basic telecom operators lose price advantage and restricting their development. Simply relying on the monopoly price advantage wouldn’t improve the competitive ability of basic operators. Basically, basic operators and virtual operators should make further negotiation to figure out the more flexible pricing mode.

With the industrial policy and market environment, basic operators and virtual operators must be able to drive the industry innovation to co-create new situations of mobile communication market in China as long as they can stick to a relation of both competition and cooperation by means of the opportunity of mobile communication service.

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