Paper

Negotiations on regulated markets

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Abstract—The paper considers some problems of negotiations between competitive subjects on regulated market. It is assumed that two subjects (players) have to compete with each other on the retail market and cooperate on the wholesale market. The wholesale market is regulated. The role of the regulator is to support players in negotiations, especially by introducing recommended solutions when the negotiations were broken off. It is considered how introducing a recommended solutions influence the process of negotiations on the wholesale market and a decision problem of choosing retail strategy, that precedes the process of negotiations. A decision problems of a regulator are also formulated. The problems are discussed in context of competition and cooperations between operators on the telecommunications services market.

Keywords— negotiations, regulations, market games.

1. Introduction

Competition and cooperation, these two radically different kinds of co-existence meet at one time and one place during a negotiation process. If both (or every of) sides are convinced, that the best way to realize their own aims is to cooperate with the other side, then they usually meet both together at a negotiations table, and try to find solution that would be better for both of them, then the solutions accessible outside the table. Limited resources, however, involves them into competition: each side (the most frequently) wants to get the highest or the best part of the divided "cake". So competition is natural part of the negotiations process. However it is specific kind of competition. This competition arises only, because both parts want or have to cooperate. So in negotiations competition is something like a daughter of the cooperation.

In networking businesses like, e.g., telecommunications there exist also opposite case: the players are sometimes forced to cooperate, because they operates on the same market (what makes them competitors) and so they have to interconnect their networks to provide full services for their own customers. So in such cases cooperation is a daughter of competition. However sometimes this is a daughter by one part unwanted. The strongest part, the higher faith that competition is a sufficient (or the best) tool for obtaining intended goals, and the lowest will for cooperation. So increasing the power outside the negotiations table increases also the power at the negotiations table, and at the extreme case the powerful player does not want to negotiate at all. Paradoxically this can also eliminate competition, because without interconnection weaker player cannot operates profitably. This is the reason, why in some cases it is impossible to transform a monopolistic market into competitive market (or safe from the opposite process), without active support by the third party.

On the telecommunications services market the role of such third party plays national regulator authority (regulator). On of the main instruments for supporting competition, which can be used by the regulator, is the possibility of forcing the strongest side to negotiate, and if the negotiations were broken off, possibility of introduction recommended solutions for forced cooperation.

The paper considers some problems of negotiations between competitive operators on regulated market. It is assumed that two players – A and B have to compete with each other on the retail market (in relation to the end customers) and cooperate on the wholesale market (interconnection). The wholesale market is regulated. The role of the regulator is to support players in negotiations, especially by introducing recommended solutions if the negotiations were broken off.

It is considered how introducing a recommended solutions influence the process of negotiations on the wholesale market and a decision problem of choosing retail strategy, that precedes the process of negotiations. A decision problems of a regulator are also formulated.

2. Definition of the negotiation power

The negotiation (bargaining) power can be defined into two ways:

– as a positive power, that enables the player to obtain a good outcome for himself;

– as a negative (antagonistic) power, that enables the player to deteriorate the outcome of the other player.

Let's denote the positive power of – respectively, player A and B – by α_p^A and α_p^B. The negative powers will be denote by α_n^A and α_n^B. The highest negative power of the player (e.g., A) the lowest positive power of the other player (B) and vice versa. Assuming that the bargaining powers sums up to one we have:

$$\alpha_p^A = 1 - \alpha_n^B, \quad (1)$$

$$\alpha_p^B = 1 - \alpha_n^A. \quad (2)$$

We assume that the negotiation power (positive and so negative) comes from the best alternative to a negotiated agreement (BATNA) [4, 11, 14] – a solution, that the player can obtain if the negotiations were broken of. So braking the negotiations is one of the possible solutions of the negotiation process. However this solution is not a unique one, because outside the table players can play as positively so negatively. Hence a situation of breaking the negotiations can be described by for different strategies of playing outside the table:

h_{pp} – both players play in a positive way;

h_{nn} – both players play in a negative way;

h_{pn} – player A plays positively, player B plays negatively;

h_{np} – player A plays negatively, player B plays positively.

We assume that if the player played in positive way then (independently of the way of playing by the other player) he/she would get higher value of the payoff function than if he/she played negatively. We also assume that he/she would get higher value of the payoff function if the other player played positively than if he/she played negatively. Hence we get:

$$V^A(h_{pp}) \geq V^A(h_{pn}) \geq V^A(h_{np}) \geq V^A(h_{nn}), \quad (3)$$

$$V^B(h_{pp}) \geq V^B(h_{np}) \geq V^B(h_{pn}) \geq V^B(h_{nn}). \quad (4)$$

Which strategy, and so which value of the payoff function defines BATNA of the players? BATNA is the best alternative so it should reflects the positive playing by the player. But it also must be attainable (independently of the way of playing by the other player). So $V(h_{pp})$ cannot define BATNA of the players because it is not attainable if one of the players played in a negative way. So the answer is h_{pn} for player A and h_{np} for player B. These strategies leads to the highest payoffs from these that players can be sure to obtain.

Using the concept of BATNA we can define the negotiation powers of the players as follows:

$$\alpha_p^A = 1 - \alpha_n^B = \frac{V^A(h_{pn}) - V^{A\min}}{V^{A\max} - V^{A\min}}, \quad (5)$$

$$\alpha_p^B = 1 - \alpha_n^A = \frac{V^B(h_{np}) - V^{B\min}}{V^{B\max} - V^{B\min}}, \quad (6)$$

where:

$$V^{A\max} = \max_l V^A(h_l), \quad (7)$$

$$V^{B\max} = \max_l V^B(h_l), \quad (8)$$

$$V^{A\min} = \min_l V^A(h_l), \quad (9)$$

$$V^{B\min} = \min_l V^B(h_l). \quad (10)$$

For numerical reasons it can be sometimes useful to make small modification:

$$\alpha_{\varepsilon p}^A = 1 - \alpha_{\varepsilon n}^B = \frac{\max\left\{V^A(h_{pn}) - V^{A\min}, \varepsilon\right\}}{\max\left\{V^{A\max} - V^{A\min}, \varepsilon\right\}}, \quad (11)$$

$$\alpha_{\varepsilon p}^B = 1 - \alpha_{\varepsilon n}^A = \frac{\max\left\{V^B(h_{np}) - V^{B\min}, \varepsilon\right\}}{\max\left\{V^{B\max} - V^{B\min}, \varepsilon\right\}}, \quad (12)$$

where ε is a small value.

As we see from Eqs. (1) and (2) there is no direct relation between positive and negative negotiation power of a given player (e.g., between α_p^A and α_n^A). Also there is no direct relation between positive negotiation power of one player and positive negotiation power of the other player (between α_p^A and α_p^B). Similarly there is no direct relation between negative powers of the players (between α_n^A and α_n^B).

However if we compare and sum up sides of the Eqs. (1) and (2) then we get:

$$\alpha_p^A - \alpha_n^A = \alpha_p^B - \alpha_n^B, \quad (13)$$

$$\frac{\alpha_p^A + \alpha_n^A}{2} + \frac{\alpha_p^B + \alpha_n^B}{2} = 1. \quad (14)$$

Equation (14) can be expressed as

$$\alpha^A + \alpha^B = 1, \quad (15)$$

where α^A and α^B can be treated as aggregated negotiation powers of the players A and B and are:

$$\alpha^A = \frac{\alpha_p^A + \alpha_n^A}{2}, \quad (16)$$

$$\alpha^B = \frac{\alpha_p^B + \alpha_n^B}{2}. \quad (17)$$

3. The impact of recommended solution on the process of negotiations

In the case of telecommunications market, the operators must negotiate the rules of the interconnection agreements. However in many cases there is a high difference between negotiation powers of the players, especially when one of the sides is an incumbent operator. New entrant of the market has usually much smaller network, and so much less end users connected to its network, than operating for long time incumbent. So it is necessary for new operator to interconnect its network to incumbent‘s network. But it is not necessary for the incumbent. This makes that the incumbent has very strong and new entrant very weak BATNA in the negotiation process. This difference, without protection by the third side, can be exploited by the stronger player with large disadvantage of the weaker player.

For the reasons of promotion fair competition the role of a regulator is to support new entrants in the negotiation process. The main instrument for doing this is possibility of recommending reference solutions for the negotiated interconnection agreement, and in the case of breaking off the negotiation without any agreement, possibility of forcing this solutions.

Now we will examine how such a recommended solution, which we denote as h^*, influences the negotiation process.

3.1. Disclosure the values of BATNA

Recommended by a regulator strategy h^* defines new BATNA of the players. In the case without a recommended strategy h^* BATNA of the both players is defined by two different strategies:

h_{pn} – defines BATNA of the player A;

h_{np} – defines BATNA of the player B.

Now BATNAs of both players are defined by strategy h^*.

Probably the most important thing for the process of negotiation is not that h^* defines *new* BATNAs, but that these BATNAs *are commonly known*. BATNA defines the positive negotiations power of the players: a player does not agree on the strategy that gives him worse outcome than his BATNA. So players would like to have as high BATNA as possible. But they also want the other player to think that it is also hight if really it is not. So in many situations players misrepresents and lie one another on the true value of their BATNA. Recommendation of a strategy h^* defines new and commonly known BATNA, and so makes such misrepresentations and lies impossible.

3.2. Integration of BATNAs

In the case without a recommended strategy h^* player A could be sure, that he/she could get the payoff not smaller than $V^A(h_{pn})$, and the player B could be sure, that he/she could get the payoff not smaller than $V^B(h_{np})$. But in the case of existing recommended strategy h^*, which can be chosen by both players, player A can be sure, that he/she could get the payoff not smaller than $V^A(h^*)$, and player B can be sure, that he/she could get the payoff not smaller than $V^B(h^*)$. So now the BATNAs of both players is determined by the same strategy – h^*. So we have something what can be called as *integration* of BATNAs. In some cases this fact can be very helpful in the negotiations process.

Example 1. Let's consider a simple example of the negotiations between player A and B. There are two accessible strategies at the negotiations table: h_1 and h_2, and four strategies outside the negotiations table: h_{pp}, h_{nn}, h_{pn} and h_{np}. For each strategy players obtains different values of payoff function, as in Table 1, which are commonly known. For example if during a negotiations players chose strategy h_1, then player A would obtain $V^A(h_1) = 10$ and player B would obtain $V^B(h_1) = 6$.

Table 1
An example of the positive impact of the integration of BATNAs on the negotiations process

Strategy	$[V^A(.), V^B(.)]$
h_1	[10,6]
h_2	[6,10]
h_{pp}	[5,4]
h_{pn}	[2,1]
h_{np}	[1,3]
h_{nn}	[0,0]

In the case that there is not a recommended strategy h^* BATNA of the player A is determined by strategy h_{pn} and equals $V^A(h_{pn}) = 2$. In this case BATNA of the player B is determined by strategy h_{np} and equals $V^A(h_{np}) = 3$. Negotiations game has two effective solutions (both obtained at the table) for strategy h_1 and h_2. Player A prefers the solution for strategy h_1 because than he obtains $V^A(h_1) = 10$, but player B prefers the solution for strategy h_2, cause then he obtains $V^A(h_2) = 10$. So both players would like to choose different strategy, and different solution. What is important, both players have strong argumentation for choosing prefered by them solution. Player B can argue like this: „Strategy h_2 leads to the solution, for which proportion of outcomes $(6/10)$ is nearer to the proportion of BATNAs $(2/3)$ then for strategy h_1 $(10/6)$, so choosing strategy h_2 is fair solution." But the answer of player A can be also convincing: „I do not want to play negatively outside the negotiations table (what is assumed in the case of choosing strategy h_{np} outside the table). Why do You want to do so? Fair solution outside the table is $[5,4]$, when we both play positively. So h_1 leads to the solution, for which proportion of outcomes $(10/6)$ is the nearest to the proportion of outcomes for the fair solution outside the table $(5/4)$, and choosing strategy h_1 is really fair solution!"

Both parts have strong argumentation, and if any different (creative and profitable) solution would not be found, than negotiations can be broken off, and the result of the game would be inefficient. The problem arises from existing several different reference solutions outside the negotiations table: BATNA of the player A, BATNA of the player B, result for the case that both players play positively (strategy h_{pp}).

Recommendation of the strategy h^* gives new or makes stronger one of the before existing reference solution. In some cases it can exclude every different references. For example, if a regulator recommends strategy $h^* = h_{pp}$, than there would be only one important reference point for the negotiating party. This strategy would define new BATNAs of the players and so, any different strategy outside the table could not be chosen. So the player A could argue that the proportion of the payoffs for strategy $h^* = h_{pp}$ defines fair proportion of the outcomes, and so strategy h_1 is more fair than strategy h_2 at the table, and the player B has not comparatively strong argument for choosing strategy h_2. This can make negotiations simpler and faster.

Of course, recommendation of the strategy h_{np}, although also integrates BATNAs of the players, would have not so strong impact on the improving of the negotiations. If for example a regulator recommends strategy $h^* = h_{np}$, player A can still argue that he does not want to play negatively outside the table, and press for regarding h_{pp} as a fair reference point. Obviously this situation makes argumentation of player B a little stronger. In the case that there was not a recommended solution it was impossible to realize simultaneously the BATNA of the players, because it would require to choose two different strategies at the same time, what is impossible. So his/her argumentation on proportion of BATNAs was somehow weak. Now, when h^* defines new BATNA of both players this argumentation becomes stronger.

Obviously recommendation of the strategy h_{pn}, due to the corresponding values of the outcomes $[2,1]$ would make radically stronger argumentation of the player A. Now proportion of (new) BATNA $(2/1)$ and proportion of the outcomes for positive playing $(5/4)$ indicates on the strategy h_1 as a much more fair solution then h_2.

□

Above illustrated example shows that changing the recommended strategy h^* changes the power of argumentation for choosing different strategies at the negotiations table. In fact changing (and before it introducing) a recommended strategy h^* changes the negotiations power of the players. Now we will examine this subject with distinction on the positive and negative negotiations powers of the players.

3.3. The impact of recommended solutions on the negotiations power of the players

As it was sad above, recommended solution integrates BATNA of the players, so that strategies h_{np} and h_{pn} no longer defines it, but it is determined by strategy h^*. Each player cannot be sure that he/she can obtain the outcome higher then determined by strategy h^*, because always the other player can brake off the negotiations and require the regulator to introducing strategy h^*. But from the other side, each of them can be sure that he/she can obtain the outcome not smaller than determined by h^*. So h^* defined new BATNA of both players.

This integration of BATNAs can simplify negotiations process by reducing a reference solutions outside the negotiations table for fair one at the table. However, as it was illustrated in Example 1, this depends on which strategy is recommended. Recommending of some strategies can make negotiations simpler and faster, but recommending some different can make negotiations more difficult and slower. Now we will examine this problem, by analysing how different recommended strategies influence the negotiations power of the players, with distinction on positive and negative power.

The reasoning is simple: the higher BATNA of the player, the stronger his/her positive negotiations power, and the lower negative power of the other player. So we can write the following relations:

- If recommended solution is under BATNA of the player A: $V^A(h^*) < V^A(h_{pn})$ than decreases positive negotiations power of the player A and increases negative negotiations power of the player B.
- If recommended solution is above BATNA of the player A: $V^A(h^*) > V^A(h_{pn})$ than increases positive negotiations power of the player A and decreases negative negotiations power of the player B.
- If recommended solution is under BATNA of the player B: $V^B(h^*) < V^B(h_{np})$ than decreases positive negotiations power of the player B and increases negative negotiations power of the player A.
- If recommended solution is above BATNA of the player B: $V^B(h^*) > V^B(h_{np})$ than increases positive negotiations power of the player B and decreases negative negotiations power of the player A.

Conclusions from above relations are that by recommending strategy h^* regulator can:

- Increase positive and at the same time decrease negative negotiations power of both players. It occurs when: $V^A(h^*) > V^A(h_{pn})$ and $V^B(h^*) > V^B(h_{np})$.
- Decrease positive and at the same time increase negative negotiations power of both players. It occurs when: $V^A(h^*) < V^A(h_{pn})$ and $V^B(h^*) < V^B(h_{np})$.
- Increase positive and negative negotiations power of player A and at the same time decrease positive and negative negotiations power of player B. It occurs when: $V^A(h^*) > V^A(h_{pn})$ and $V^B(h^*) < V^B(h_{np})$.
- Decrease positive and negative negotiations power of player A and at the same time increase positive and negative negotiations power of player B. It occurs when: $V^A(h^*) < V^A(h_{pn})$ and $V^B(h^*) > V^B(h_{np})$.

As we see, depending on the values of the payoff functions of the players for a recommended strategy h^*, the negotiations power of the players can be changed in different ways. In special cases the regulator can increase or decrease simultaneously positive and negative negotiations power of a one player, or increase one and decrease the other.

In the telecommunications services market, recommended by a regulator strategy h^* represents necessity for interconnection networks of the players on the basis defined by h^*. As we see now, depending on the relations between $V^A(h^*)$ and $V^A(h_{pn})$, and between $V^B(h^*)$ and $V^B(h_{np})$ this necessity may be profitable for one player or both of them or unprofitable for the other or both of players. If h^* were worse[1] for a player than its BATNA, then it would be better for him not to interconnect its network. It is strongly possible that such a situation takes place in the case of incumbent operator. In many situations incumbent is not willing to interconnect its network with the network of a new entrant, because its BATNA (strategy outside the negotiations table) is better than any strategy which could be accepted by the entrant during the negotiations (at the table). At the other side we can expect that usually h^* is better than BATNA of a new entrant, because such operator is willing to interconnect its network on the basis defined by recommended strategy. So we can suppose that in most real

[1]A separate problem arises with an issue of the evaluation's period: short or long?

situations we meet with the last two, above mentioned situations: introducing strategy h^* increase positive and negative negotiations power of one player (new entrant) and simultaneously decrease positive and negative negotiations power of the other (incumbent operator).

Intuitive thought is that it could be the best situation if introducing h^* could improve BATNA of both of the players: $V^A(h^*) > V^A(h_{pn})$ and $V^B(h^*) > V^B(h_{np})$. However we can be sure that it would be the best only if the players would like to agree on the basis of the strategy h^*, because the better h^* the more then they obtain. It in fact means that the players did not agree at the negotiations table, but one of them require arbitration from the regulator. Such arbitration (strategy h^*) would be better for both of players then their BATNA (their best alternative without interconnection) but it have not to be better than the best, accessible, but probably difficult to find solution at the negotiation table. So in some cases we can expect that the better h^*, the more simple negotiations (the players can simply agree to choose h^* at the negotiations table), but at the same time (probably), the more difficult (the less incentive) to find an efficient solution.

From the other side, if h^* were worse than BATNA of both of players: $V^A(h^*) < V^A(h_{pn})$ and $V^B(h^*) < V^B(h_{np})$ interconnection on the basis of the strategy h^* makes a loss for both of players. In other words it would be better for both of them to not interconnect their networks, than interconnect on the basis of h^*. However it does not men that recommendation of h^* worse than BATNA of both of players has not any sens. We should remember that new entrant would like to agree with incumbent on the basis of any strategy that is not worse than its BATNA, and that probably such strategy exists. If such strategy would be also better for incumbent than strategy h^* can be used by an entrant as a threat: "if you don not agree on interconnection on the basis better than my BATNA I would require arbitrations form a regulator!"

What's more, it is also possible, that such situation can give strong incentive for both of players to search for strategy that would be better then BATNA of both of them, so more, probably efficient. So we can expect that recommendation h^* that is worse then BATNA of both of players can make negotiations more difficult, then in the case when h^* were better then BATNAs, but such situation can give more incentive for searching for an efficient solution. However this theoretical conclusions requires verifications from realistic case studies.

Obviously it is also possible, that for the case when h^* is worse than BATNA of both[2] of players ($V^A(h^*) < V^A(h_{pn})$ and $V^B(h^*) < V^B(h_{np})$) strategy h^* can be used as a really antagonistic strategy. One of the players, that aims at deteriorating the payoff of the other player can require an arbitration, because strategy h^* could the most deteriorate the outcome of the other player. Probably it is the most important reason, why it is better from a regulator point of view to recommend h^* that is better than BATNA of both players, or at least which is better than BATNA of a new entrant.

[2]It is important to notice, that if h^* were worse than BATNA of only one of the players, then choosing this strategy generally should not be (though could be) an antagonistic move, because a player, that required an intervention from a regulator may really want to obtain the highest payoff for himself, and that was why he wanted an intervention. But in fact it could be an antagonistic strategy h^* would not be efficient (if both of players could obtain more by choosing different strategy).

4. The impact of recommended solutions on the retail decisions of the players

Existing of a regulators recommended strategy h^* as a reference solution of the negotiations on the wholesale market influences not only the negotiations process (by integration of BATNA, and changing the negotiations power of the players), but also simplifies the process of making a decision on the retail market, that precedes[3] the negotiations. Retail decisions are a part of a whole game, consisted also of wholesale decisions. Recommended strategy h^* simplifies and makes more predictable the process of negotiations. Strategy h^* defines new BATNA of the players and so defines also an integrated reference point, that can be used for pointing out the fair and efficient solution of the negotiations process. This solution can be with higher than without recommendation probability predicted. And so a retail decision that precedes a negotiations is simpler and the finale result of a game more predictable.

With using the concepts of negotiations we can say that existing of a regulator's recommended strategy h^* simplifies the process of structuring the negotiations process or formulating of the problem [16]. By the structure of negotiations we mean here the size of the „cake", and the fair principle of dividing it. The size of a cake can be defined in many ways. One of the possible definitions formulates it as an average value of all accessible and better than BATNA values of payoff function. For example from an A point of view to calculate the size of a cake we should sum up the values of payoffs for such strategies h_l (the strategies accessible in negotiations) that gives the player A payoffs $V^A(h_l)$ higher than his BATNA (than $V^A(h_{pn})$ but also that gives the player B payoffs $V^B(h_l)$ better than his BATNA (than $V^B(h_{np})$). So the size of a cake is calculated with using the following relation:

$$\sum_{l, V_i^A(h_l) > V_i^A(h_{pn}), V_i^B(h_l) > V_i^B(h_{np})} V_i^A(h_l).$$

However, as it was said earlier, it is possible that the player A does not know the BATNA of the player B (the value of $V_i^B(h_{np})$), and so he can not say for which strategy h_l the relation $V_i^B(h_l) > V_i^B(h_{np})$ is true. So during

[3]There is no any impact of the recommending strategy h^* on the retail decisions that are made after a negotiations process, because when such decisions are made, important is only a finale solution of a negotiations and not the way (with or without a regulation) in which this solution was obtained.

calculation the average value of his outcomes, he would have to sum up values for which only relation $V_i^A(h_l) > V_i^A(h_{pn})$ is fulfil:

$$\sum_{l, V_i^A(h_l) > V_i^A(h_{pn})} V_i^A(h_l).$$

So, during calculation the size of a cake to much outcomes $V_i^A(h_l)$ will be used, and it decrease accuracy of this calculation.

Recommendation of the strategy h^* changes this situation. BATNA of both players is defined by this strategy and their are commonly known. So during calculation the size of a cake (an average value of the outcomes) player A can use the relation:

$$\sum_{l, V_i^A(h_l) > V_i^A(h^*), V_i^B(h_l) > V_i^B(h^*)} V_i^A(h_l),$$

what gives higher accuracy of this calculation.

Similarly, existing of the recommended strategy h^* simplifies prediction of the possible, fair principle of dividing the cake. This principle can be defined as a proportion of BATNAs of the players. Without h^* BATNA of the player B could be unknown to player A, and so unknown was the principle of division. Existing of the recommended strategy h^* leads to the situation, that player A can assume that the proportion of the finale outcomes would be mostly near to the $\frac{V^A(h^*)}{V^B(h^*)}$.

Finally a decision problem of choosing retail strategy before negotiations can be formulated as the following optimization problem:

$$\hat{a} = \arg\max_i \left\{ \frac{V_i^A(h^*)}{V_i^B(h^*)} \cdot \sum_{l, V_i^A(h_l) > V_i^A(h^*), V_i^B(h_l) > V_i^B(h^*)} V_i^A(h_l) \right\}, \tag{18}$$

where i is the index of retail strategies a_i.

5. Decision problems of a regulator

The aim of the regulator is to promote competition, and efficiency of the whole market. So the regulator should not provoke, or even create attractive conditions for an antagonistic playing. This is the main reason why h^* worse than BATNA of one or both players should not be referenced. However there are three important problems:

1. It may be difficult for a regulator to get information on the payoff functions of the players, and so difficult to determine the values of outcomes for different strategies.

2. It may be difficult for a regulator to obtain information on a real BATNA of the players.

3. Only wholesale market is regulated, and because of independent decisions on the retail markets the final result of a game even for choosing recommended strategy h^* can be difficult to predict.

First problem, is really a problem if a regulator would like to support of the players in realizing their own aims. If he does not know the payoff functions of the players he could not efficiently support them in realizing the aims that are described by this functions. However this problem is smaller, if a regulator ignores this aims, and is interested only in realizing his own aim, like a desirable market share of both players. For realizing such aim it is not necessary to know the payoff function of the players. However it could be necessary if the players did not want to cooperate on the basis of h^* but only would like to treat this strategy as a reference point (in the sens of proportion of BATNA) in searching different solution during the negotiations. In such a case, finally chosen strategy could not be good from a regulator's point of view. This problem could be partially resolved by waiting with recommending strategy h^* until one of the players requires an arbitration, and than by join in the mediation process, during which regulator could get some important information in an interested matter. Whoever such a situation can never occur. If so, from the regulator's point of view it would be better to give a reference of h^* before a starting of negotiations with hope, that finale result will be close to it.

Obviously, if the players were sure, that a regulator would be interesting in realizing their aims, then it would be profitable for them to inform a regulator about their payoff functions and the aims, they wish to realize.

In the case of unknown BATNA of the players, it is possible that recommended strategy h^* can be worse than such BATNA, and so can be treated as an antagonistic strategy. This problem arises not only from unknown best alternative of the players, but also from unknown payoff functions of the players. Alternatives are evaluated by the values of payoff functions. This payoff functions give an answer on the question why such alternative is the best. So resolving of the problem of unknown BATNA requires first resolving of the problem of unknown payoff functions. However there is also one more problem with unknown BATNA: the higher BATNA, the higher positive negotiations power. So the players want to have as strong BATNA as possible. But the real problem results not from the fact that they want to *have* strong BATNA, but from the fact that they want to make, that the other player think that they have it high even if they really had not. So it is very likely that they would misrepresent in this matter – misrepresent not only in relation to the other player but also in relation to the regulator. So we can expect that in most realistic situations regulators would not know the true BATNA of the players.

The problem of unregulated retail markets arises when a decisions on these markets are made after a negotiations on the (regulated) wholesale market. In such situations recommended strategy h^* determines not a finale result of the whole game, but a vector of possible results (in the case when only one player would make a retail decision after the negotiations) or a matrix of such results (in the case when both players would make retail decisions after the negotiations). In such cases (with assumption that the regulator knows the payoff functions of the players) a decision problem of a regulator should be treated as a multi-objective. Especially the regulator should aim at:

- Maximizing of $V^{A\max}(h^*)$ and $V^{B\max}(h^*)$ for the case of *individually effective* playing on the retail markets.
- Maximizing of $V^{A\min}(h^*)$ and $V^{B\min}(h^*)$ for the case of *antagonistic* playing on the retail markets.
- Minimizing of the coefficients of incentive for playing in an antagonistic way: $\Upsilon^A(h^*)$ and $\Upsilon^B(h^*)$,

$$\Upsilon^A(h^*) = \frac{V^{B\max}(h^*) - V^{B\min}(h^*)}{V^{A\max}(h^*) - V^{A\min}(h^*)}, \qquad (19)$$

$$\Upsilon^B(h^*) = \frac{V^{A\max}(h^*) - V^{A\min}(h^*)}{V^{B\max}(h^*) - V^{B\min}(h^*)}, \qquad (20)$$

where $V^{A\max}(h^*)$, $V^{B\max}(h^*)$, $V^{A\min}(h^*)$ and $V^{B\min}(h^*)$ are the highest and the lowest value of payoffs of the players in the proper vector or matrix.
So choosing of the strategy h^* can be expressed as the following multi-criteria optimization problem:

$$h^* = \arg\max_l \Big\{ [V^{A_{\max}}(h_l), V^{A_{\min}}(h_l), V^{B_{\max}}(h_l), V^{B_{\min}}(h_l), -\Upsilon^A(h_l), -\Upsilon^B(h_l)] \Big\}. \qquad (21)$$

6. Summary

In many real situations, like on the telecommunications services market, free cooperation of the players with highly different negotiations power is impossible. However this cooperation is often necessary for promotion fair and effective competition. That is why it is important to support weaker player in the negotiations process, by the active action of the third side, like, e.g., regulator of the market. Regulators posses highly effective tool for supporting negotiations process: possibility of forcing a recommended solution, strategy h^* which defines new BATNAs of the players, integrates it and makes it commonly known. By introducing a recommended strategy a regulator can effectively change the positive and negative negotiations power of the players. By changing the strategy h^* regulator can:

- Increase positive and at the same time decrease negative negotiations power of both players. It occurs when: $V^A(h^*) > V^A(h_{pn})$ and $V^B(h^*) > V^B(h_{np})$.
- Decrease positive and at the same time increase negative negotiations power of both players. It occurs when: $V^A(h^*) < V^A(h_{pn})$ and $V^B(h^*) < V^B(h_{np})$.
- Increase positive and negative negotiations power of player A and at the same time decrease positive and negative negotiations power of player B. It occurs when: $V^A(h^*) > V^A(h_{pn})$ and $V^B(h^*) < V^B(h_{np})$.
- Decrease positive and negative negotiations power of player A and at the same time increase positive and negative negotiations power of player B. It occurs when: $V^A(h^*) < V^A(h_{pn})$ and $V^B(h^*) > V^B(h_{np})$.

However there are three important problems:

1. It may be difficult for a regulator to get information on the payoff functions of the players, and so difficult to determine the values of outcomes for different strategies.
2. It may be difficult for a regulator to obtain information on a real BATNA of the players.
3. Only wholesale market is regulated, and because of independent decisions on the retail markets the final result of a game even for choosing recommended strategy h^* can be difficult to predict.

This is why the final result of the regulation can be difficult to predict for the regulator. For making a better decision a regulator should get as more information as possible, and precede the decision by multi-criteria analysis of the problem. It is important that in some cases, when the players were sure, that a regulator would be interesting in realizing their aims, it would be profitable for the players to inform a regulator about their payoff functions, alternatives and the aims, they wish to realize. So in such cases it is the challenge for a regulator to convince the players that it would be profitable for them to pass a relevant information.
In the case of telecommunications market, existing of a recommended strategy h^* (independently on its value) ensures that players interconnect their networks. This statement is confirmed by the observation of a market. From theoretical point of view this can be true even if defined by strategy h^* new BATNA's would be weak (in this case the players would have strong incentive to find effective solution). However for reason of possibility of using it as an antagonistic strategy it would be better to recommend such strategy, that defines possibly high BATNA of the players.

Existing of a reference solution on the wholesale market simplifies also preceding the negotiations a decision problem of choosing retail strategy, by increasing the accuracy of the formulating the structure (the size of a cake and the fair principle of dividing it) of the following negotiations.

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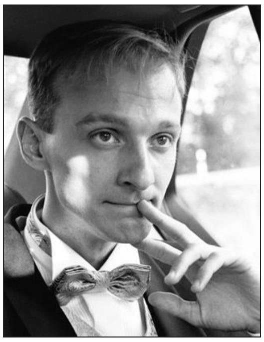

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