

Negotiations on Regulated Market

Sylwester Laskowski

National Institute of Telecommunications

www.nit.eu

www.sylwesterlaskowski.pl

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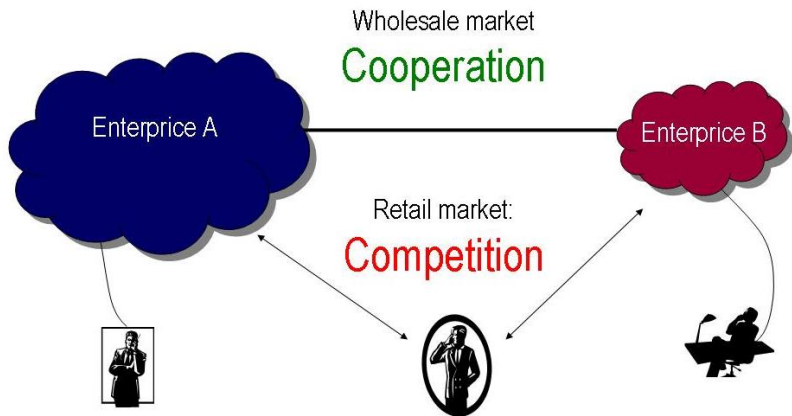
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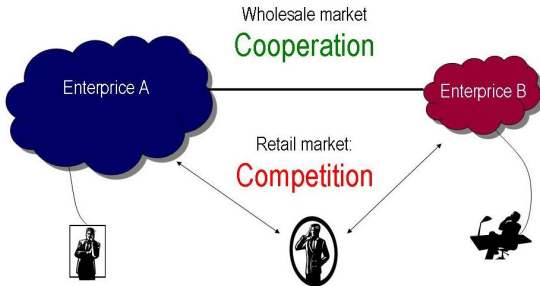
Introduction





Three processes

- 1 \mathcal{A} – A 's retail prices setting process,
- 2 \mathcal{B} – B 's retail prices setting process,
- 3 \mathcal{H} – process of negotiation interconnection fees on the wholesale market between players A and B (the move of a hypothetical player H).



Definition of the Negotiation Power



Positive power

α_p - a power, that enables the player to obtain a good outcome for himself.

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$$\alpha_p^B = 1 - \alpha_n^A = \frac{V^B \alpha_p - V^B \min}{V^B \max - V^B \min}. \quad (2)$$

Assumption

The negotiation power at the negotiation table comes from the Best Alternative To a Negotiated Agreement (BATNA) outside the negotiation table.

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Outside the negotiation table each player can play into two ways:

- 1 **Positively** – a player aims at *maximizing* of his/her own pay off function,
- 2 **Negatively** – a player aims at *minimizing* of the other players pay off function.

Negotiations strategies outside the negotiation table (after the negotiations were broken off)

- h_{pp} – both players play in positive way,
- h_{nn} – both players play in negative way,
- h_{pn} – player A plays positively, player B plays negatively,
- h_{np} – player A plays negatively, player B plays positively,

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BATNAs of the players

- $V^A(h_{pn})$ – BATNA of player A
(the result of using his/her positive power)
- $V^B(h_{np})$ – BATNA of player B
(the result of using his/her positive power)

Assumptions

Outside the negotiation table:

- 1 the player gets higher value of his/her own pay off function if he/she played positively then if he/she played negatively,

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

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

The Impact of the Recommended Solutions on the Negotiations Power of the Players



BATNAs of the players **without** recommended solutions – h^*

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Integration of BATNAs!

Example 1.

strategy	solution
h_1	[10,6]
h_2	[6,10]
h_{pp}	[5,4]
h_{pn}	[2,1]
h_{np}	[1,3]
h_{nn}	[0,1]

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Argumentation of B for h_2

" h_2 leads to the solution, for which proportion of outcomes (6/10) is nearer to the proportion of BATNAs (2/3) than for strategy h_1 (10/6)!"

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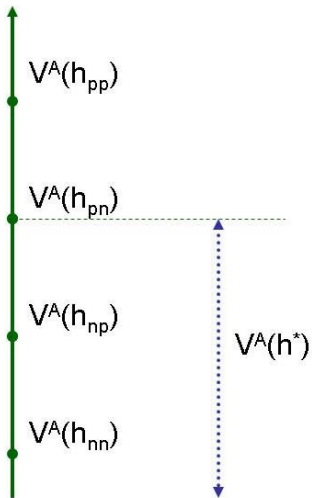
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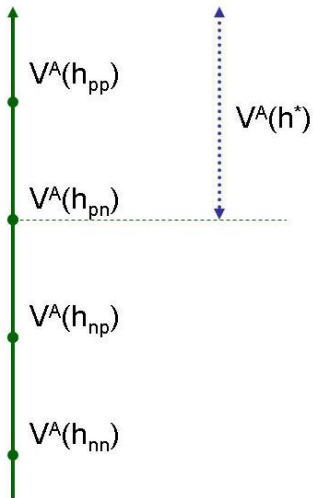
Argumentation of A for h_1

"I do not want to play negatively outside the table. Why do You want to do so? Fair solution outside the table is [5, 4]. 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)!"



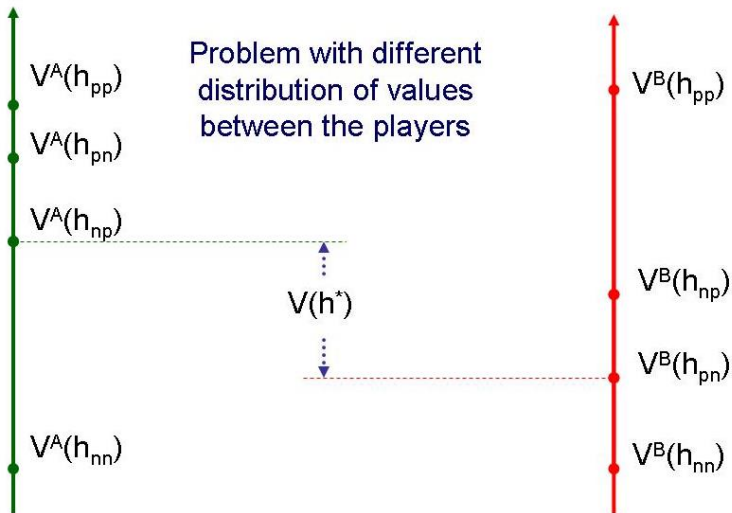
Recommended solution under BATNA of the player A

- **Decreasing** the **positive** negotiation power of the player A,
- **Increasing** the **negative** negotiation power of the player B.



Recommended solution over BATNA of the player A

- **Increasing** the **positive** negotiation power of the player A,
- **Decreasing** the **negative** negotiation power of the player B.



Example 2.

strategy	solution
$h_1 = h^*$	[4,2]
h_2	[3,1]
h_{pp}	[5,1]
h_{pn}	[5,1]
h_{np}	[4,0]
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The result of recommendation
(new BATNAs)

- **Decreasing** positive and negative negotiation power of the player A ,
- **Increasing** positive and negative negotiation power of the player B ,
- h^* – the **only available** strategy (at and outside the negotiation table)

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Reduction of the set of available strategies.

A decision problem of the regulator



Some problems of the regulator

The **result** of recommendation solution (h^*) on the wholesale market is **difficult to predict** from the whole market point of view, because of the independent and not regulated decisions of the players on the retail markets.

Some problems of the regulator

Simplifying of the **negotiations process** (by introducing recommended solutions) must **not** lead to the **more effective market** because of the possibility of increasing negative negotiation power of one or both players, and using recommended solution as an antagonistic strategy.

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- 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 $\Upsilon^B(h^*)$,

$$\Upsilon^A(h^*) = \frac{V^{B \max}(h^*) - V^{B \min}(h^*)}{V^{A \max}(h^*) - V^{A \min}(h^*)} \quad (5)$$

$$\Upsilon^B(h^*) = \frac{V^{A \max}(h^*) - V^{A \min}(h^*)}{V^{B \max}(h^*) - V^{B \min}(h^*)} \quad (6)$$

A decision problem of the players



When to set strategy on the retail market?

Before the negotiations on the wholesale market

- . Possibility of formulating the structure of the negotiations:
 - ① Admissible values of the outcomes of the both players (the size of the divided „cake”)
 - ② Proportion of BATNAs of the players (fair principle of division of the „cake”)

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Remark: recommended solution h^ integrates BATNA of the players and so makes unambiguous principle of division of the „cake”*

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The optimization problem of the player A in such a situation can be formulated as follows:

$$\hat{a} = \arg \max_i \left\{ \frac{V_i^A(h^*)}{V_i^B(h^*)} \cdot \left(\sum_{l, V_i^A(h_l) > V_i^A(h^*), V_i^B(h_l) > V_i^B(h^*)} V_i^A(h_l) \right) \right\}. \quad (7)$$

When to set strategy on the retail market?

After the negotiations on the wholesale market

- 1 Possibility of making the last move, and so finale determination of the solution of the whole game,
- 2 Possibility of treating retail strategy as an incentive to set a required wholesale strategy in the negotiations.

Brief summary

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- 3 can reduce the set of available negotiation strategies,
- 4 are difficult to predict because of unregulated retail markets,
- 5 should be set as a result of multi-objective analysis.

Thank you for your attention.

Questions?