THE ANALYSIS OF THE PROCESS OF TAKING OVER COMPANIES BASED ON THE THEORY OF GAMES

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Abstract

The changes proceeding in Europe have caused the increase of takeovers recently. The European Union, globalization and competitiveness increase make the taking over process necessary for existence and development of companies. Of course, one cannot buy every number of shares without any limitations. Legalities are conformed to the Directive of the European Parliament 2004/25/WE. Nowadays, in Poland, there is a discussion about public offering act from 2005, especially the change of limit of obligatory offer is considered. In this work one tool of the theory of games is presented and used to analyze takeovers (the power index of Banzhaf). There is also a discussion about the limit of obligatory offer in chosen country of European Union. It is compared to Polish law and assessed with the use of tools of cooperative games. The solution based on the theory of games is proposed to solve the problem of the limit of obligatory offer.

Key words: Banzhaf power index, cooperative games, takeover

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Introduction

Europe used to be characterized by many factors which did not foster takeovers, for example the reluctance to foreign capital for fear of the menace of national interests, binding to familial properties and ethical aspects (Prokop, 2001). Nowadays, however the changes proceeding in this part of the world have caused the increase of takeovers, especially hostile. The European Union forming process, globalization and the increase of competitiveness make the takeover bids process necessary for the companies to keep on the market. Of course, it is not possible to acquire every quantities of securities by offeror (without any limits). There are legal regulations relating to takeover bids and securities sale in each Member State. They should be according to European Parliament and Council Directive 2004/25/EC of 21 April on takeover bids. The Directive establishes a framework of general requirements which Member States are to implement through more detailed rules in accordance with their national

systems and cultural contexts. The rightness and assumptions of the directive started a great discussion (Clarke, 2009).

In Poland, the act concerning a public offer from 2005 has recently also stirred up a discussion. The threshold of mandatory bid has been changed in a project of amendment of a low to accommodate it to the low generally accepted in Europe (Obrycka, 2012). However, the proposed changes met with great criticism as well because of the nature of Polish market. In this work, this problem will be considered on the base of the theory of games. It is one of the methods for proper decisions making in the world of economics (Gambarelli & Owen, 2004). One of its practical application is an employment of cooperative games to analyse the takeover of companies (Sroczyńska-Baron, 2011). It seems to be a better tool than only percentages because the powers of the players are, in generally, not proportional to the weights (Leech, 2013). In this work, Banzhaf index is used as the most proper one (Leech, 2002). One can use special algorithm to calculate it (Levy, 2011).

The main aim of this work is to evaluate the threshold of mandatory bid and present the power index as a proper tool for the analysis of takeovers and help for shareholders to assess their situations. The problem of the measurement of influences seems to be always actual and very important. Good solutions of this problem in one area could help to solve similar problems in other, which the European Union meets, for example the rotation voting system recently adopted by the European Central Bank (Di Giannatale & Passarelli, 2013).

1   Legal regulations for takeover bids in Germany and Poland

1.1   Legal regulations for takeover bids in Germany

The market of Germany is characterized by significant share of medium – sized family companies, which are not generally favorable to takeovers. This country is considered as one of the most negatively attitudes to takeovers. Both legislation and public opinion do not promote takeovers. Legal regulations are gathered in the Act "Wertpapieerwerbs – und Ubernahmegesetz" of 1 January 2002 with amendments. There are three kinds of offers with a mandatory bid at the level of 30% of shares. This level of threshold is often considered as a rational one and concurrently it obliges commonly in Europe.

1.2   Legal regulations for takeover bids in Poland

In Poland an offeror is obliged to keep the following legal rules applicable to the conduct of bids according to the Act of 29 July 2005 on a public offer:

- the offeror is required to make a bid of the purchase of shares representing not less than 66% of all in the offeree company when the offeror is going to hold shares representing at least 33% of them in that company,

- the offeror is required to make a bid of the purchase of all other shares of the offeree company when the offeror is going to hold shares representing at least 66% of them in that company.

The rules were criticized inter alia in view of two fixed thresholds of mandatory bids: 33% and 66%. The limit 33% often confers control in a company but it allows to launch a bid only till 66% of shares. There are fears for protection of minority shareholders – not all of holders of remaining securities are able to require the offeror to buy their securities at a fair price and to withdraw from the investment in such a situation. On the other hand, the obligation to launch a bid for all other holdings after the threshold of 66% of securities applies when the takeover is in principle conducted. The majority shareholder can stop the acquiring at the level of 65% of securities which certainly gives him the control of the offeree company without the obligation of a bid for the rest of securities. It seems that defensive action for minority shareholders is too weak and do not satisfy the assumptions of the Directive in Poland. Although the Directive does provide for arrangements in the area of the protection of minority shareholders, it leaves it up to Member States themselves to establish the threshold of mandatory bid. Ministry of Finance has been working on the amendment of the Act on a public offer. There are still proposed two thresholds: 33% and 66% of securities for mandatory bids but for all other holdings in both cases (Obrycka, 2012).

The draft amendment of the Act in Poland with the threshold of 33% is similar to the law of many Member States including Germany. However, there are many negative opinions of it in Poland. One should consider that there are usually widely dispersed shareholders in countries with the threshold at the level of one – third, what is not so obvious in Poland.

2   Methodology

In this work the n – person cooperative game are used. The idea of the value is used to solve them. It is defined as the weighted sum of profit growths, which one player gives to all coalitions he belongs to. Power index is a particular value of games for simple games (characteristic function of this kind of games takes only two values: 0 or 1 – it means, that the coalition is a wining one or not). One of the most popular indices is Banzhaf index (Sroczyńska-Baron, 2010).

$$\beta_i(\upsilon) = \frac{c_i}{\sum_{j \in I_n} c_j} \qquad (1)$$

where c_i is a number of coalitions with the player i as a decisive player (it means the coalition with this player is a winning one, without him is a loosing one). Banzhaf index assigns a part of whole winnings to each player. The part is proportional to number of coalitions for which the player is a decisive one. It is said that Banzhaf index measures power as an influence. The value which is gained by the coalition is the possibility of control. This kind of index also ignores the order of players attachment to coalitions. That is why Banzhaf index is more often used to examine the shareholders structure. There are many popular tools to evaluate the companies, for example TMAI (Węgrzyn, 2007) and others (Węgrzyn, 2008), but to evaluate shareholders structure of those companies Banzhaf index seems to be proper one.

In this work the power index was used to check the situation of a company – offeror and the threshold of 30% for obligatory offer. The model of large games with an outcome majority (half of shares, which are possessed only by main players) was used to analyze it (Gambarelli, 1994). It was assumed that there were m main players and infinitive number of small players who did not have any influence indyvidually.

3   The researches

3.1   Data

The analysis of chosen takeovers in Germany based on the power index was conducted during the researches. There are considered three examples from the stock exchange in Germany as a country characterized by restrictive policy towards takeovers and the threshold of 30% of securities for mandatory bids. Each of these takeovers has a slightly different character. The takeover of Mannesmann AG by Vodafone Group Plc is the most famous one in Germany. Mannesmann was a diversified conglomerate established in 1890 and quoted in Frankfurt. Vodafone is a telecommunications company established in 1991 and quoted in London. Vodafone made an offer to Mannesmann, which was quickly rejected. Then, Vodafone made bid directly to the shareholders of Mannesmann. This attempt of takeover started a public discussion on the ethic aspects of takeovers in Germany. However, it was full of hypocrisies because of the earlier takeover of British company Orange by Mannesmann, which did not meet with any protests. The shareholders of the company Mannesmann AG in the end of 1999 is presented on fig. 1.

Fig. 1: **The shareholders of Mannesmann AG XI 1999**
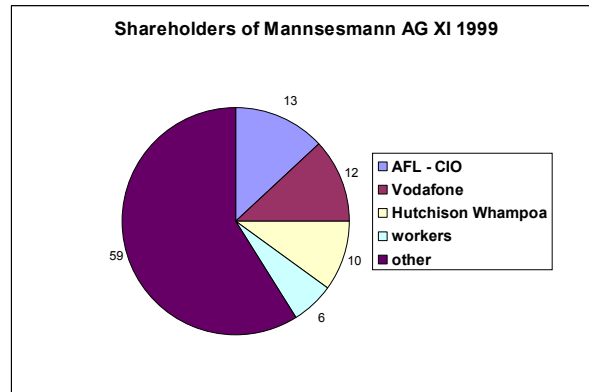
Source: own work based on www.guardian.co.uk/business/1999

In 2010 there was another attempt of takeover in Germany, which met with criticism in public opinion. Hochtief AG was a company of construction industry established in 1874 and quoted in Frankfurt. The group ACS is a Spanish architecture company established in 1997 and quoted in Madrid. The attempt of the takeover of Hochtief AG by ACS also met with great discussion. The group ACS made an offer in 2010 but this company was in debt at that time. There was a fear that strong German economy would have to support weaker Spanish one during the crisis. It caused political protests. Hochtief even introduced a new shareholder Quatar Holding with 9% to rescue the company. The shareholders of the company Hochtief AG in the end of 2010 is presented on fig. 2.

**Fig. 2**: **The shareholders of Hochtief AG XII 2010**
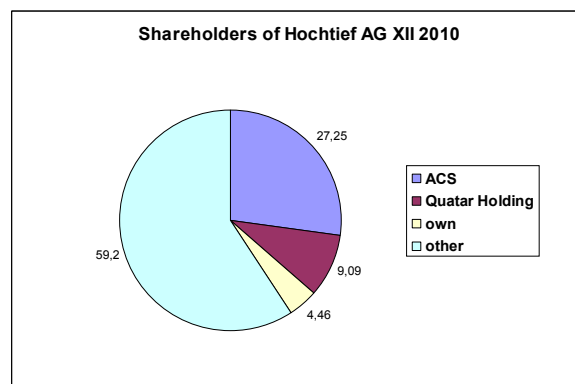
Source: own work based on www.reports.hochtief.com

The third history analyzed during the researches is connected with Volkswagen Group and Porsche Automobil Holding SE. This a little bit different history because there is not so visible element of hostility. Volkswagen Group is a German company established in 1937 and

quoted in Frankfurt. It is famous for the production and sale of cars. Porsche Automobil Holding SE is also German company established in 1931 and also quoted in Frankfurt. Both companies were related before the war but afterwards they started the production of cars under their own brands. In 2005, Porsche bought 19% of Volkswagen shares. It was a rescue against the hostile takeover by another company. The shareholders of the company Volkswagen in the end of 2006 is presented on fig. 3.

Fig. 3: **The shareholders of Volkswagen AG XII 2006**
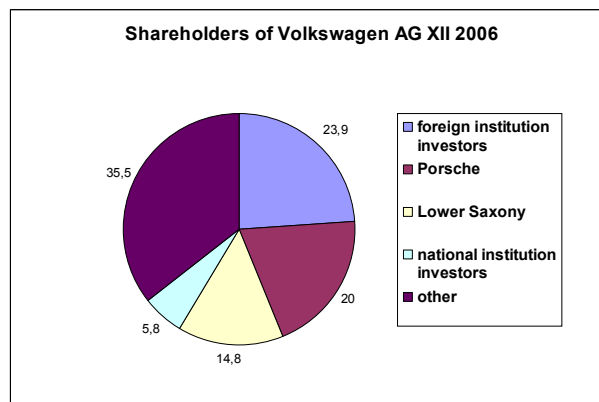
Source: own work based on Volkswagen AG. Annual Report 2006

3.2   Run of researches

First, the takeover of Mannesmann AG by Vodafone Group Plc was analyzed during the researches. There are four main players if the concentration of all influences is assumed to be focused in hands of main shareholders. The influence of the mass of small players is ignored. Let AFL – CIO be a player A, Vodafone be a player B, Hutchison Whampoa be a player C and workers be a player D. Banzhaf index was calculated for all players. The outcome majority was taken as 20,5%. The results are the following: $\beta_A = 1/3$, $\beta_B = 1/3$, $\beta_C = 1/3$, $\beta_D = 0$. It is observed that the group of workers did not take any part in the attempt of takeover. Their position was too weak – Banzhaf index is equal 0. Furthermore, there is no clear dominance of Vodafone – each of other main players has Banzhaf index equal 1/3. However, it is useful to check the changes of the position of the invader with the possible increase of shares possession to have the full image of the situation in this company. The threshold of 30% of obligatory offer is also marked by grey color. The results are presented in table 1.

Tab. 1: Banzhaf index for Mannesmann shareholders during the possible increase of shares possession by Vodafone

Holdings of B [%]	β_A	β_B	β_C	β_D
12	0,33	0,33	0,33	0
17	0,25	0,42	0,25	0,08
18	0,17	0,5	0,17	0,17
29	0,1	0,7	0,1	0,1
30	0	1	0	0

Source: own computation

It is observed that 30% of shares gave the real control in the company. So the situation of aggressor was really good. A relatively small amount of shares gave the control because of great participation of small shareholders. Concurrently, the requisition of the obligatory offer on the rest of shares seems to be honest – it is connected with achievement of the control in the company and could not meet with objection of Vodafone. The history confirmed good situation of Vodafone pointed by analysis of Banzhaf index. Finally, the company Mannesmann accepted an offer of takeover in spite of earlier protests in February 2000.

Next, the takeover of Hochtief AG by ACS Group Plc was analyzed. There are three main players if the concentration of all influences is assumed to be focused in hands of main shareholders. Let ASC be a player A, Quatar Holding be a player B and Hochtief be a player C. Banzhaf index was calculated for all players. The outcome majority was taken as 20,4%%. The results are the following: β_A = 1/3, β_B = 1/3, β_C = 0. It is visible that in December 2010 the takeover was conducted in fact. Banzhaf index is equal 1. The level of 27% of shares was completely sufficient. Quatar Holding did not improve the situation of Hochtief. What is more, the level of obligatory offer was not exceeded. The position of aggressor ASC was perfect. The offeror had a real control in the company without the requisition of the obligatory offer on the rest of shares. Next, it was checked how many shares did the aggressor need in fact to take a control in the company. The results are presented in table 2.

Tab. 2: Banzhaf index for Hochtief shareholders during the possible changes of shares possession by ASC

Holdings of A [%]	β_A	β_B	β_C
30	1	0	0
27	1	0	0
14	1	0	0
13	0,67	0,17	0,17

Source: own computation

The limit value proved to be much lower than the threshold of 30%. The amount of 14% allowed to take control thanks to great amount of small shareholders. Of course, the history confirmed perfect situation of ASC pointed by analysis of Banzhaf index. Finally the group ASC gained the level of 53% of shares in November 2011, what improved its credit situation.

The last analysis is connected with the takeover of Volkswagen by Porsche. There are four main players. Let the group of foreign institution investors be a player A, Porsche be a player B, Lower Saxony be a player C and the group of national institution investors be a player D. Banzhaf index was calculated for all players. The outcome majority was taken as 35,55%. The results are the following: : β_A = 1/3, β_B = 1/3, β_C = 1/3, β_D = 0. It is observed that the group of national institution investors did not take any part in the attempt of takeover. Their position was too weak – Banzhaf index is equal 0. Furthermore, there is no clear dominance of Porsche – each of other main players has Banzhaf index equal 1/3. However , it is useful to check the changes of the position of the invader with the possible increase of shares possession. The results are presented in table 3.

Tab. 3: Banzhaf index for Volkswagen shareholders during the possible increase of shares possession by Porsche

Holdings of B [%]	β_A	β_B	β_C	β_D
20	0,33	0,33	0,33	0
30	0,33	0,33	0,33	0
33	0,17	0,5	0,17	0,17
44	0,08	0,75	0,08	0,08
45	0	1	0	0

Source: own computation

The thorough analysis of Banzhaf index showed that the threshold of 30% did not give the position of dominator to Porsche. What is more, the position of Porsche was exactly the same as in 2006 when it possessed 10% of shares less. But the most important fact was that the position of dominator could be gained only at the high level of 45% because of the configuration of shareholders. The position of Porsche was really bad. It required considerable investments to conduct the takeover. Moreover, one must remember that Porsche was obliged to buy more shares if such a need would be after the threshold of 30% but without any control in the company. Of course, the history confirmed bad situation of Porsche pointed by the analysis of Banzhaf index. The company was acquiring shares of Volkswagen, but finally it leaded to its crisis because of taken credit in May 2009. After all, both companies made decision and established a common car group, but under the leadership of

Volkswagen Group, which bought 49,9% shares of Porsche and helped it to overcome some financial problems.

Conclusion

In his work, there are presented the different histories of three German companies, which met with the problem of takeovers. The position of offeror was examined with the use of the tools of cooperative games - Banzhaf index. The real situation of companies could be presented thanks to the theory of games. Particularly important examination was the calculation of index during the possible changes of shareholders. It helped to describe honestly the situation of these companies.

The researches showed that the threshold of 30% for obligatory offer do not always work properly. This is neither universal nor effective limit in many situations. The more dispersion of shareholders, the lower limit of real control in the company – it could be much lower then 30% in many cases. Concurrently, if there are not many small shareholders, the limit could be much higher. So there are not protected the interests of small investors in many situations (the company – offeror is not obliged to make bid for other shares after acquiring the control). On the other hand, the offerors are often required to make an obligatory offer without the position of dominator.

To conclude the discussion, the threshold of 30% seems to be proper in countries, where the companies with dispersion of shareholder structure are predominate. However, in countries with opposed tendency, the solution should be different. Maybe, it would be more proper to use just Banzhaf index instead of percentages. It is universal tool analyzing the structure of the power, insensitive to shareholder structure, especially with the model of large games presented in this work. Fixing one level of this index as the threshold of obligatory bid would allow to standardize the situations of companies – offerors at the moment of excess of it and would better protect the interests of small shareholders.

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