EBERHARD KARLS
UNIVERSITÄT
TÜBINGEN

University of Tübingen
Working Papers in
Economics and Finance

No. 57

Board Directors' Preferences: What are Good Aggregation Rules?

by

Mihael Duran

Faculty of Economics and Social Sciences
www.wiwi.uni-tuebingen.de

Board directors' preferences*

What are good aggregation rules?

Mihael Duran†

February, 2013

Abstract

I analyze how boards of directors with heterogeneous preferences can affect the information shared with the CEO with the help of a cheap-talk model that allows for large groups of receivers. This paper provides new insights on how heterogeneity of boards can change the way of communication between the board and the CEO, related to different ways of decision making. My model gives some insights how heterogeneous preferences can have an impact on how communication between CEO and the board of directors takes place. I also indicate how coalition forming in the boardroom can be influenced by director's and CEO's perferences. Finnaly this model gives a possible answer why board of directors hetreogeneity differs even for shareholder representatives if there are any empoyees on the board.

JEL-Classification: C71, C72, D72, D82, G34.

Keywords: board of directors, cheap talk, director's preferences, heterogeneity, multiple audiences.

* FFor detailed comments, I am grateful to Agnes Bäker, Marlies Kluike, Stefan Rostek and Kerstin Pull as well as the participants at the German Economic Association Meeting 2012 in Graz, the 16th Colloquium on Personnel Economics 2013 in Tübingen, the 5th Meeting of the International Banking and Finance Soceity 2013 in Nottingham, as well all seminar participants at the University of Tübingen and the ratio Colloquium for Young Social Scientists 2012 in Stockholm. All remaining errors are my own. Financial support by the Hans Böckler Foundation (Project No. 2011-429-2) is gratefully acknowledged.

† Mihael Duran, University of Tuebingen, Department of Human Resource Management and Organization, Nauklerstr. 47, 72074 Tuebingen, Germany, E-Mail: mihael.duran@uni-tuebingen.de

1 Introduction

The composition of boards and their effect on firm performance is a widely studied field (for a survey see Adams et al., 2010). Composition and effects can both be observed and studied from outside the firm. However, the link between board composition and board effect remains a black box of what happens inside the board room. How composition influences performance can only be observed from inside the board room. This article attempts to shed some light into this black box. I propose that the decisive link between board composition and board performance lies in the directors' preferences and how coalitions are formed in the boardroom.

In this paper I analyze non-routine project selection processes of the board as a communication game between the CEO and a heterogenous board. The most closely related paper to mine is the *theory of friendly boards* by Adams and Farreira (2007). They show for a board with a dual role (monitoring and advising role) that more information is shared if the board is not monitoring to extensivley. My model is based on the information transmission subgame of their model (Crawford and Sobel, 1982). I do not consider the other parts of the Adams and Farreira (2007) model. Keeping all other things equal this extension could be transferred back into their model. My extension is methodologically related to Goltsman and Pavlov (2011), who introduced a cheap-talk model with two receivers.

For a more fruitful analyzation of the information transmission process I introduce an audience with more than two receivers. When we consider larger audiences it gives rise to new questions on how to solve the decision process within the receiver's group. In the paper of Goltsman and Pavlov (2011) this problem does not arise in the same way as in this paper, since in their model both receivers choose their action independently. However, this assumption is not suitable for audiences in which some kind of collective decision is made. I first consider a collective decision rule in the board room which is still closely related to the case described by Goltsman and Pavlov (2011). In my extension I consider more complex decision rules. Allowing for coalition forming and vote weighting by power indices has a crucial impact on how *informative communication*[1] takes place. For the main praxis-oriented contribution of this paper I extend the findings to supervisory boards and codetermination. However, my model can be adapted to many other governance systems as my investigation of employee representatives can be transferred to any other group inside a board. Section 3 concludes.

[1] I use the expression *informative communication* as it is common in cheap-talk literature. This means communication can be totally uninformative if the sender and the receiver are too biased in their preferences. In this case only a *babbeling* equilibrium exists where the receiver will take the action she would take if no communication happens at all based on her expectations of the sender's preferences.

2 The Model

My model builds upon three basic ideas. First, the key role of boards is to monitor the CEO, but boards have to advise the CEO in non-routine situations. Second, boards are speaking with one voice according to prior agreement. The last two ideas are adapted from Adams and Farreira (2007). Third better informed boards are more effective in both advising and monitoring, and forth, bords totally depend on the CEO for firm-specific information.

Following the basic assumptions I change the setup of Crawford and Sobel (1982). Using the common cheap-talk game terminology I call the principal receiver and the agent sender. For the model I assume a finite number of players, one sender and multiple receivers, where the CEO is the sender and the board members are the receivers. The CEO observes a value $a \in A = [0, 1]$, where *A* is a set of possible projects to invest in and *a* is in the current state of the world the most preferred project, while the board does not observe a. Then the board chooses the size of the project, s.

As in Adams and Farreira (2007) I assume the utility functions to be quadratic loss functions. Henceforth the utility function of the CEO is

$$U_{Ceo} = -(g(s) - a)^2. \tag{1}$$

And the utility function for a board member *i* is

$$U_{B_i} = -(g(s_i) - a - b_i)^2 \tag{2}$$

with an individual bias $b_i \in \mathbb{R}$ where $i \in I$ is an integer greater than zero and *I* is a given finite board size. The decision of the board, $g(s)$, is a function represented by the single votes of the board members, $g(s_i)$, built on some decision rule, g. In the basic model I assume $g(s_i) = s_i$. Or in other words I exclude strategic voting and every board member votes on their preferred project. Given these utility functions, the CEO's most preferred project in *a* is $g(s) = a$ and board member's *i* most preferred project is $s_i = a + b_i$. The utility for a given project *a* for the CEO and all board members decreases in the distance between a and $g(s)$, or s_i, respectively. The bias b_i measures the similarity of the CEO's and of an individual board members' preferences. For higher values of b_i, a board member prefers to invest more, while a board member with a lower value of b_i prefers lower investments. For b_i closer to zero preferences are more aligned. Note that these quadratic loss functions show a reverse bias compared to most cheap-talk games, since in most cases the bias is assumed on the sender's side. However, this does not change the relationship in any qualitative way. I assume for the bias $b_i \in \mathbb{R}$. Hence, the unbiased target function, here the

sender's utility function, could be rewritten as a biased function by simply holding the receiver's bias constant. Mathematically *b* is the x-coordinate and a change in bias is just a horizontal shift of the quadratic utility functions. To emphasize this we subtract the bias in the utility function instead to add it as it is common in most cheap-talk games. In this way this model allows for multiple receivers and is still comparable to other cheap-talk games. A different interpretation of this model could be to consider multiple sender-receiver games between every single board member and the CEO. By doing this the bias can be rewritten on the CEO's side for every b_i. Since we assume a corporate decision on the receiver's side, it is easy to see that this would be an unnecessary complication for our purpose and changing the bias to the receiver's side would lead to the same outcome.

I define an equilibrium of a given game between the CEO and the board analogous to Goltsman and Pavlov (2011) as an equilibrium outcome function $s : A \to \Delta(\mathbb{R}^n)$ if, in this equilibrium, the probability distribution over the project selection of the board for the possible project *a* is given by the vector $s(a) \in \Delta(\mathbb{R}^n)$. Assuming we have an interval partional form as in Crawford and Sobel (1982), we can establish Bayesian-Nash euqilibria in the following proposition.

Theorem 1. Any equilibrium of the cheap talk game is characterized by a sequence of cutoff types $0 = a_0 < a_1 \ldots < a_N = 1$ such that the equilibrium outcome $s(a)$ is a constant action pair on every interval (a_K, a_{k+1}) for $i \in I$.

This proposition equals proposition 2 (i) in Goltsman and Pavlov (2011). For the model I only consider public communication. This simplification does not change this model's outcomes in any fundamental way. As I assumed the project selection depends on a corporate decision of the board. Only the outcome of the decision is payoff-relevant for the CEO, not the single votes. Furthermore it is not feasible to exclude *public communication* in this environment.[2] The CEO has to inform the whole board[3], which would make distinguished communication difficult to conceal.

2.1 Compromise Solution

Before we can determine which project the board will choose we need to specify which decisions of the board are reasonable. At first consider voting power symmetry among all board members. I further assume a compromise is normally agreed. These strong simplifications allow us to assess some interesting outcomes of this model. If the CEO faces a group of heterogeneous directors who only differ in their individual preferences b_i, the CEO behaves as if she is facing a single board

[2] Contrary to private communication the sender cannot communicatate with the receivers separately. In *public communication* only communication with all receivers at the same time takes place.

[3] For example the German Corporate Governance Code (section 3.4.) states for the CEO an obligation to report to the supervisory board.

member whose preferences are equal to the average board member's preferences, $\overline{b} = \frac{1}{I}\sum_{i=1}^{I} b_i$. Note that this assumption is closley related to the *median voter theorem*.

Theorem 2. There is an euqilibrium of the cheap talk game characerized by cutoff types $0 = a_0 < a_1 \ldots < a_N = 1$ if and only if the cheap talk game between the sender with utility funtion $U_C = -(g(s) - a)^2$ and the receiver with utility function $U_B = -(g(s) - a - \frac{1}{I}\sum_{i=1}^{I} b_i)^2$ has an equlibrium with the same cutoff types as in proposition 1.

This proposition 2 represents a generalization of proposition 2 (ii) in Goltsman and Pavlov (2011). Note that there is a special case where the average bias is equal to zero, $\overline{b} = \frac{1}{I}\sum_{i=1}^{I} b_i = 0$. In this case, the preferences of CEO and a representative board member are perfectly aligned and all information is revealed. Unlike in a two player game preferences can be perfectly aligned for all $b_i \neq 0$ if there are sufficient negative as well as positive biases. This characteristic is called *mutual discipline* (Farrell and Gibbons, 1989). The presence of one receiver disciplines the other receivers and vice versa. In other words it is possible to induce the CEO to reveal all information even if her preferences are not perfectly aligned with any single member of the board. Although this is a very special case and not likely to happen, it helps us to consider when more information will be shared between the board and CEO. As Spector (2000) showed, information is almost perfectly shared if preferences differ very little.

For a non-extremist CEO and if we assume a distribution with a skewness close to zero, we can see that for larger boards (higher *I*) the average bias $|\overline{b}|$ is decreasing. This leads us to my first non-intuitive result. The possibility of more information sharing is rising in larger boards. However, this does not hold for highly skewed distributions. If the distribution of biases has a positive or a negative skew, the average bias could be too low or too high to allow any informative communication at all. If the skewness is not too large, another phenomenon described by Farrell and Gibbons (1989) can arise , the so called *one-sided discipline*. Intuitively, there is a threshold $b^* \in \mathbb{R}_+$ for the average bias $|\overline{b}|$ such that there exists an equilibrium if and only if $|\overline{b}| \leq b^*$. In this case informative communication is possible even if there are some board members whose bias is higher than the threshold, $|b_i| > b^*$, if there are sufficient board members whose bias is lower then the threshold, $|b_i| < b^*$. The presence of sufficiently board members with closly aligned preferences *disciplines* the higher biased board members. In other words, if there is a majority of board members who differ very little in their and the CEO's preferences a compromise is agreed on even if there are some higher biased board members.

2.2 Coalition forming

Consider now a decision process on the board where a majority decides on which project to invest in. If for example the required threshold is fifty percent, a coalition with more than fifty percent of the votes would dominate all other coalitions. Hence, the resulting voting power of such a coalition is higher than their share of votes. A widley noticed discussion of such unproportional voting powers is the work of Banzhaf (1965). His power index is a measure where the voting power of a group is proportional to the square of their total votes.

The Banzhaf-Index[4] relates to which member of a winning coalition can cause a *swing*. A member of a coalition can cause a swing if his withdrawl from that coalition would turn the winning coalition into a losing coalition. Winning coalitions are coalitions whose sum of votes is at least the required threshold for a collective decision, while all other coalitions are losing coalitons.

Using the Banzhaf-Index (Banzhaf , 1965) to study a board's decision, the required threshold is more than half of the total votes in most cases. A winning coalition will need at least half of the votes of all board members. The resulting relevant bias for the CEO would then be $b_C = \frac{1}{C}\sum_{i=1}^{C} b_i$. Here *C* stands for coalition, in this case the winning coalition. Note that there can be, and most likely will be, multiple equilibria which statisfy this condition. It is intuitive to assume a coalition is more likely to be formed if the biases of all coalition members are closer aligned, but $|b_C|$ could be so high such that no information between the CEO and board is shared. In this case, the only equilibirum is a completly uninformative equilibirum such that the winning coalition would decide based on their own beliefs regardless of any information sent by the CEO. As we saw before, informative communication is increasing in larger boards. If a coalition decides to exclude some board members, it follows that informative communication will be decreasing.

However, there could be a coalition where even more communication takes place than in the *grand coalition*. Given a uniform distribution of preferences the case of a more communicative coalition is not more likely to happen than any other possible coalition. The phenomenon of *mutual discipline* would therefore be less likely in coalition building boards. If the skewness of a distribution is a result of a few extreme biased board members, we can assume these extremists to be higher biased to the average bias of any winning coalition. This leads us to the next proposition of this paper.

Theorem 3. For two possible winning coalitions with the same power index the coalition with the lower average bias will be prefered by most coalition members.

[4] The Banzhaf-Index is calculated as follows: $B_k = \frac{C_k}{2^{n-1}}$ where C_k is the number of coalitions where one coalition member can cause a swing.

Proof. Assume a winning coalition to be in the interval $b_L \leq b_C \leq b_U$ within the lower boundary b_L and the upper boundary b_U. If there are two possible winning coalitions with the same power index with $C_0 = [b_L, b_U]$ and $C_1 = [b_{L+1}, b_{U+1}]$ such that $|b_L| \leq |b_{L+1}|$ and $|b_U| < |b_{U+1}|$ then coalition C_0 would have a lower average bias. It follows $C_1 \prec C_0$ for all coaliton members in C_0 since coalition C_0 offers the closer aligned preferences. □

For extremistic biased board members, proposition 3 results in a more likely exclusion from decision making. Most coalition members will exclude any extremistic board member if there is a less biased board member who can have the same impact as the extremist. Both coalitions (C_0, C_1) can be an equilibrium. But one (C_0) offers a higher value to all coaliton members, hence this is preferred. Overall, in coalition building environments, *one-sided discipline* still holds for skewed bias distributions where *one-sided discipline* would otherwise fail without coalition forming.

2.3 Supervisory Boards and Codetermination

In this section I will further extend this model to include an application of supervisory boards with codetermination, with a focus on the German governance system. German public held companies (*Aktiengesellschaft* or *AG*) have a dual board structure. The executive management board (*Vorstand*) is responsible for firm operations, while the supervisory board (*Aufsichtsrat*) has a role that is similar to the Anglo-American boards of directors. Their responsibilities include long-term decisions, selection of a CEO, and evaluation of the executive's performance (Prigge , 1998).

Following our discussion of power indices we could assume that the shareholders and the employee representatives are two different coalitions. The outcome of such a situation is easy to estimate if we assume a strong social cohesion (at least) for the shareholders' representatives. Since the shareholders' representatives always have more seats or are favored by decision rules (second vote rule[5]), their normalized Banzhaf-Index would always be 1 and the employee representatives' index would be 0. In this case the relevant bias for the CEO would be the average shareholder representatives' bias $b_R = \frac{1}{R} \sum_{i=1}^{R} b_i$. Hence, this solution is only efficient if the shareholders can choose a CEO whose bias is closely aligned with the shareholder representatives' bias in the supervisory board. Which is a very strict assumption. As Jensen (1986) showed: "Managers have incentives to cause their firms to grow beyond the optimal size". For such an *empire building* CEO who prefers to overinvest, the assumption of closely aligned preferences will very likely fail. At least the probability of more informative communication will be lower for boards, with shareholders totally dominating employee representatives, since the shareholders' perferences are not closely aligned with the CEO.

[5] The chairman of the supervisory board, usually a shareholder representative, has a second vote to solve a possible standoff.

If we assume some skewed distribution for the shareholder representatives' individual biases, we cannot simply conclude that the majority of board members or the second vote rule always outvotes the employee representatives on the board. Following proposition 3 it is possible to think of situations where the bias of one or more shareholder representatives are closely enough aligned with the employee representatives and the CEO to allow some coalition forming. This is a possible explanation as to why there could be situations where CEO and employees would collude against most shareholders. In their empirical study, Gorton and Schmid (2004) hypothesize codetermination would change the target function of a firm. They observe lower shareholder value and higher employment for German codetermined firms. Following this model, this could be an indication for at least some individual biases of shareholder representatives beeing closer aligned with employee preferences. Informed shareholders can anticipate that such an appointment of their representatives to the board would not lead to the desired outcome. Hence, shareholders would appoint representatives whose preferences are known to be less aligned with employees.

3 Conclusion

The black box of the board room seems to be less black after investigating the information transmission process between CEO and board. These models gives some insights how heterogeneous preferences can have an impact on how communication between CEO and the board of directors takes place. This paper offers a few relevant policy implications for corporate governance structures. The first implication of my model is that informative communication between CEO and board rises with the size of heterogenous boards. The reason behind this is that different preferences can discipline other board members, and a more effective compromise can be agreed on. An other model outcome indicates how coalition forming in the boardroom can be influenced by director's and CEO's perferences. This could be an interesting topic for empirical studies to ask why some coalitions are more frequently than others and how this is related to firm performance. Finnaly this model gives a possible answer why board of directors hetreogeneity differs even for shareholder representatives if there are any empoyees on the board.

References

Adams, R. B., Farreira, D., 2007. A theory of friendly boards. The Journal of Finance 62 (1), 217–250.

Adams, R. B., Hermalin, B. E., Weisbach, M. S., 2010. The role of boards of directors in corporate governance: A conceptual framework and survey. Journal of Economic Literature 48 (1), 58–107.

Banzhaf, J. F., 1965. Weighted voting doesn't work: A mathematical analysis. Rutgers Law Review 19, 317–343.

Crawford, V., Sobel, J., 1982. Strategic information transmission. Econometrica 50 (6), 1431–1451.

Farrell, J., Gibbons, R., 1989. Cheap talk with two audiences. The American Economic Review 79 (5), 1214–1223.

Goltsman, M., Pavlov, G., 2011. How to talk to multiple audiences. Games and Economic Behavior 72, 100–122.

Gorton, G., Schmid, F. A., 2004. Capital, labor, and the firm: A study of german codtermination. Journal of the European Economic Association 2 (5), 863–905.

Jensen, M. C., 1986. Agency costs of free cash flow, corporate finance, and takeovers. The American Economic Review 76 (2), 323–329.

Prigge, S., 1998. A survey of german corporate governance. In K. Hopt, H. Kanda, M. Roe, E. Wymeersch, and S. Prigge (Eds.), Comparative Corporate Governance, State of the Art and Emerging Research, 943–1044. Oxford University Press.

Spector, D., 2000. Pure communication between agents with close preferences. Economic Letters 66, 171–178.