A Model of Consensus in the European Commission

David L. Bijl and Scott W Cunningham
Faculty of Technology, Policy & Management
Delft University of Technology
2600 GA Delft, The Netherlands
ScottC@tbm.tudelft.nl

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1 Introduction

The European Union is an interesting field of study for game theorists, because of the impact of decisions made at that level, and the complexity of the institutions. Several models have been constructed to analyze the interactions within the Council of Ministers, and between the Council and other European decision-making bodies including the Commission, the Parliament, the European Council, the European Court of Justice, and lobbyists.

This paper adds to the current research by extending an existing model and applying it to the *internal* decision making of the European Commission. If models of the Commission are to be linked with models of other European institutions, the "factual" outcome may be as important to model as the payoffs. To accommodate this, our model extends the solution concepts of the core and ε-core to include the decision outcomes. For the Commission, these outcomes take the form of proposals for new legislation that are then accepted, rejected or amended by the Council (and in some cases, the Parliament).

Descriptive accounts of the European Commission indicate that there is a strong motivation among commissioners to reach consensus. We suggest that the value of ε (in the ε-core solution concept) may be used directly in modeling the subjective (added) value of reaching consensus in the Commission.

This remainder of this paper is structured as follows. First the proposed model will be related to previous literature. The next section briefly describes the various European institutions and the features of the European Commission that make it a unique modeling object. Section 4 introduces the mathematical definitions of the model, and our extension of the standard definitions of solution concepts. The last section offers conclusions about the presented model and a number of recommendations for further research.

2 Theory

The decision making process within the Commission, resulting in legislative proposals, has often been described but seldom been modeled with game theory. In modeling the legislative process at the European level, a number of approaches have been used. A convenient sub-division can by made by distinguishing cooperative from non-cooperative game theory, although this boundary starts to blur when examining repeated games in strategic form (Shubik 1981, p. 306).

2.1 Social and Scientific Relevance of the Problem

Analyzing the Commission is of strong scientific interest. Tsebelis (2002) argues that standard classifications of governmental systems are inadequate to explain the European Union. The very existence of the Commission within the European Union is a challenge to available theory:

> This political system is neither a presidential nor a parliamentary regime. It is sometimes unicameral, sometimes bicameral, and yet other times tricameral, and in addition one of its chambers decides with multiple qualified majority criteria. . . Thus the European Union is a blatant exception to all traditional classifications (p. 1).

Despite this, interest in analyzing decision making in the Commission is high. The Commission plays a very significant role, for instance, in initiating new environmental or technological legislation. Thus, interest is strong in understanding European Commission decision-making for the purposes of policy analysis (van Overveld 2008).

Policy adoption can not be understood solely as a matter of political prerogatives for ”institutions are like shells, and the specific outcomes they produce depend the actors that occupy them (Tsebelis 2002, p. 8).” Decision-making in the Commission often focuses on how the game itself ought to be played. Thus decision-making procedures in the Commission are amorphous and strategically ill-defined. This paper adopts a cooperative game theory perspective for two reasons. First, the decision-making procedures are outcome oriented. Second, the decision-setting is amorphous and strategically ill-defined. Aumann (van Damme 1998) discusses the appropriate role and significance of the cooperative and noncooperative branches of game theory.

2.2 Challenges for Modeling

Models of the European Commission are challenging for multiple reasons. The Commission is already a small body, and will continue to diminish in the future when there will be fewer Commissioners then there are member states. Klimek (et al. 2008) provide theoretical and empirical evidence that smaller cabinets more frequently converge on a decision than larger decision-making bodies. Perhaps it is not surprising then that decision-making in the Commission is often consensual. Thus, while coalitional processes undoubtedly shape outcomes, these coalitions are not always apparent to outsiders.

Commissioners are assigned portfolios, or areas of exclusive legislative interest. Further, it is upon the Commission that the European Union confers ”legislative initiative.” Therefore the Commission can frame, although not unilaterally approve, new legislation. The power of the Commission therefore lies in the setting of an agenda. The selection of specific proposals from a slate of competing legislation is often an important facet of Commission operations. Compare for instance ”multi-issue representations” of coalitions (Shoam & Leyton-Brown 2009).

A final challenge is the fact that the Commission is designed to represent the European Union as a whole, and not the member states. Further, the Commissioners are appointed by member states and not by direct election. Thus, Commissioners are not directly exposed to electoral pressures. Commissioner motivation is likely to be more policy seeking than either vote seeking or office seeking (Strom 1990). These aspects of the Commission do not present a problem for formal analysis; but the policy seeking motivation may be under-examined in the literature.

2.3 Previous Research

Dhillon (2005) offer very generalizable results about political coalition building. The model addresses the interaction between policy preferences and democratic voting procedures. The model, in particular, examines the nature of party formation on multi-dimensional policy preferences. The multidimensional nature of policy preferences is relevant to this discussion; however the discussion of direct electoral representation is not relevant here.

Tsebelis & Garret (1996) contrast their non-cooperative (or competitive) “institutional” approach with the cooperative (or coalitional) “power index” approach. They demonstrate how the Commission could strategically choose the formulation of the legislative proposal, based on knowledge about Council members’ preferences and the voting rules that apply. (For example, the Council may accept a proposal with a qualified majority vote, but needs unanimity for amending the proposal). Hammond (1996) presents similar models, displaying a range of possible ways to analyze public decision making with formal mathematical models.

Tsebelis (2002) advances a unified theory of comparative governance involving ”veto players.” Tsebelis’ approach involves formal, deductive models. The model can be used to analyze policy preferences of the Commission, and is partially supported by confirmatory empirical analysis. These models only partially overlap with cooperative game theory in their terminology and ideas. Confirmation and comparison of results with cooperative game theorists is therefore limited.

The power index approach seeks to compute the relative power for all EU member states as they are represented in the Council. The index is based on a number of factors, including results of coalitional game analysis. For example, an insignificant member state may become very influential in some issues, because its support is needed to form a voting majority. Within this approach, recent work by Passarelli & Barr (2007) includes the European Commission as “agenda setter”. Bilbao et al. (2002) have studied the time complexity of the algorithms used in calculating a number of voting power indices.

The approach of this paper is neither a competitive process-oriented model, nor a power index, but directly applies cooperative solution concepts to the problem situation. With *cooperative* solution concepts, the assumption is that cooperation generally creates value, which makes the characteristic function form a very suitable game representation.

McKelvey (1975) has demonstrated that a chairman could use clever agenda design to achieve any outcome of a majority voting process (subject to some far-reaching assumptions). For the voting processes of the Council, the Commission performs this agenda-setting role. Tsebelis & Garret (1996) use the term “agenda setting power” in the same way. Whereas many game models treat the Commission as a unitary actor, our model describes how the Commission’s “agenda setting” actions are actually determined by the commissioners.

The idea is not to suggest that the Commission alone can determine EU policy making, but to provide a way of linking a model of the Commission with models of the Council, lobbyist influences, and possibly even more European institutions. Although the present model is only a first step, one can envision how linked models may be constructed for European decision making, analogous to Putnam’s (1988) two-level games. Two level games are also used in the ”domestic constraints model” proposed by Stokman & Thomson (2004). We suggest that the legislative proposals formulated by the Commission can be used to link together models of European institutions. To our knowledge, no existing model has explicitly included the set of possible formulations of these legislative proposals.

Dijkstra (et al. 2008) examine the results of decisions made about Commission proposals in the European Council. The authors use a voting trade model with externalities which may be functionally equivalent to the cooperative game theory core. This paper, however, treats European Commission as a unitary body for decision-making purposes.

An interesting question that is not yet confronted in this paper, is to what extent commissioners are independent from their member states. Döring (2007) uses biographical data of commissioners to investigate the degree to which member states use the appointment of new commissioners to exercise control over the Commission. Trondal (2008) examines the degree of autonomy of the European Commission by focusing on the behavior of ”seconded national experts”. Hooghe (1999) presents empirical findings about top level bureaucrats serving the Commission, and their preferences for either a bureaucratic merit-based organization, or for representation of nationalities in organization and policymaking. These factors would have to be considered when detailing the commissioners’ preferences over possible proposal formulations.

3 Problem

3.1 European institutions

The European Commission is a major institution, but functions within a very interconnected web of formal and informal European institutions. Whereas the Commission’s role is to propose legislation, next to some executive tasks, the Council of Ministers (or simply “Council”) approves or rejects legislation proposals. The European Parliament has a somewhat similar role, but differs from the Council because its members are elected directly by the population of Europe. To complicate matters, there is also a European Council, which is a meeting of the heads of member state governments, and attracts more media attention than the meetings of the Council of Ministers.

Apart from these central institutions, analysts have also recognized the importance of other organizations. These include a permanent representation of each member state (similar to an “embassy in Brussels”), industry lobby organizations, political parties in the Parliament, and numerous research and advisory committees.

The Commission has two distinct roles to play. Each commissioner has a number of portfolios to manage, which is done through bureaucracies called Directorates General. Next to these administrative or executive tasks, the *College* of commissioners meets every week to debate and decide on legislation proposals to present to the Council.

3.2 Commission decision making

The process of “agenda setting” in relation to the European Commission can be examined at three different levels: (1) the agenda for the weekly meetings of the college of commissioners, (2) the legislation proposals formulated by the Commission and sent to the Council and Parliament for approval, and (3) the broader and longer term policy direction or preferences of the Commission and its President. Is seems that the most practically relevant level is the second one, the formulation of legislative proposals, which will be the focus of this paper.

According to Bomberg & Stubb (2003:49), only 10 to 20% of Commission proposals deal with really new legislation or ideas from within the Commission. These are the proposals that are of interest for this research paper.

The way the Commission makes its decisions, partly depends on “hard” factors, such as the number of commissioners, the fact that meetings are weekly, and the influence of the Commission President in determining the agenda of the weekly meetings (Spence, 2006:27). Although these factors are not included specifically, the model does incorporate the fact that decisions can be made by simple majority voting, and that any commissioner can call a vote at any time (Spence, 2006:48).

A number of “soft” factors may also have an enduring effect on the decisions made by commissioners. The commissioners’ interests may be shaped in one direction by selection during their nomination and approval procedures. After getting the job, their interests may shift in a different direction because of the security of their tenure (Spence, 2006:38,42), and socialization in the Commission. (See Egeberg

(2006) for a good discussion of the various influences shaping commissioners' interests). The model presented in this paper can not place much emphasis on the interests of the individual commissioners, but the demand of "collegiality" is modeled explicitly.

Collegiality in general refers to the importance of mutual support, teamwork, and consensus within the college of commissioners. Particularly, collegiality means that once a collective decision has been made, it must be vigorously defended by all commissioners (Spence, 2006:47). Another reason for a general sense of collegiality is the fact that commissioners must expect to work with each other for at least five years, so there is not much room for hostilities. Also, the Commission as a whole must stand together against the Council and the Parliament, as there is a continuing struggle between the European institutions over decision making power (i.e. Spence, 2006:39,40).

4 Model

4.1 Model Setup

This section introduces notation for the base of the model, to which a solution concept will later be applied. Definitions are introduced for players, coalitions, proposals, utility, payoffs, characteristic function, imputations and effectiveness.

Players and coalitions

Let N be the set of all players. The players are the commissioners of the European Commission, and thus the number of players is *finite*. Players are identified with index i and the numbers $i = 1, 2, \ldots, n$ $(\in N)$.

Players may work together in *coalitions*, which can be any subset $S \subseteq N$. The set containing all coalitions is denoted by C. Although the Commission prefers to reach consensus, it may take a majority vote to force a decision. The set containing all coalitions that form *majorities*, is

$$M \subseteq C \qquad \text{with} \qquad S \in M \iff \mid S \mid > \frac{\mid N \mid}{2}$$

Here $\mid S \mid$ denotes the *number of elements* in set S.

Proposals

During its time in office, the Commission formulates legislation proposals on a whole range of different issues. This model concerns the decision-making process of formulating a proposal on a *single issue*.

We write F for the set of all theoretically possible formulations of the proposal, and $f_0 \in F$ for the null option (or status quo) of not agreeing on any of the formulations. The more formally correct "formulation $f \in F$ of the proposal" will often be simplified into "proposal $f \in F$".

Utility

The interaction between the players determines the outcome (one of the proposals), which in turn determines the realized utility for each player. Most authors (i.e. Dijkstra, Van Assen and Stokman, 2008) model the preferences of players as having one preferred policy outcome, with linearly declining utility for other outcomes in a space of possible outcomes. This paper uses a more generalized definition of utility functions, in order to make the model more applicable to real situations.

The set of possible proposals may contain a (countable) infinite number of elements, but does not accommodate *intervals* of proposal formulations. If a true continuum of possible proposals exists in reality, this can often be adequately modeled by a sufficient number of discrete proposals. (If it is absolutely necessary to use an interval (i.e. $F = [0, 1]$), additional restrictions might be applicable for the utility or preference functions, i.e. continuity or differentiability.). Whereas existing models assume (continuous) proposal *spaces*, our model can also be used when there is only a (discrete) set of proposals in reality.

We define the utility of every proposal for every player as follows:

$$u : N \times F \to \Re$$

This utility is not defined in absolute terms, but *relative* to the utility of the *status quo* f_0. Therefore, by definition $u(i, f_0) = 0$ for every player $i \in N$.

Payoffs

A payoff vector $(x_i)_{i \in N} \in \Re^n$ contains the (possible) payoffs for every player i. At times, the payoff may only be specified for a certain coalition S, in which case the notation $(x_i)_{i \in S}$ is used.

In games with *transferable payoff*, it is assumed that each coalition of players can achieve a "payoff" to the coalition as a whole, which is then called the "value" or "worth" of that coalition. The payoff is called transferable, because it may be distributed among the members of the coalition, as individual payoffs, in any desired way (see Osbourne & Rubinstein p.257).

It is often tacitly assumed that there is no reason for a coalition to distribute some of its value to players who are not in the coalition. Depending on the practical meaning of coalitions in the problem situation, this may very well be the case, and therefore we assume that transfers of coalition payoffs to non-coalition-members are possible as well.

The decision making within the Commission is modeled as a game *with transferable payoffs.* Because the Commission decides on many issues over a long period of time, and highly values "collegiality", it can be assumed that players may informally trade their support of certain proposals. Suppose that, on a certain issue, a certain player accepts a lower individual utility in order to reach a consensus yielding a high utility for the rest of the group. The sacrificing player can be compensated by the promise of deciding more in line with his preferences on future issues. Although the currency of the compensation is only informal, the fact that such social compensation takes place in the Commission is best modeled by a game where payoffs are transferable.

Characteristic function

Many cooperative solution concepts use the *value* of a coalition, or the *characteristic function*. Here, the value is defined as *the maximum value a coalition can not be prevented of achieving*. The value of a coalition S is understood in terms of the sum of the utilities of its members as compared to their utilities under status quo:

$$v(S) = \begin{cases} \max_{f \in F} \left(\sum_{i \in S} u(i, f) \right) & \text{if } S \in M; \\ \min_{f \in F} \left(\sum_{i \in S} u(i, f) \right) & \text{if } S \notin M. \end{cases}$$

Whether a coalition has enough members to be a majority ($S \in M$) or not, is a defining factor for the value of that coalition. Because a majority coalition derives the power to achieve its payoffs solely from the voting procedure, a majority must always be formed around a proposal.

The characteristic function should be real-valued and have $v(\emptyset) = 0$ (for example, see Lucas, 1971:499). The characteristic function defined above, is real-valued because the utility functions are also real-valued. We also define $v(\emptyset) = 0$, and this is intuitively consistent with the way $v(S), S \neq \emptyset$ is defined: If no coalition forms, the result is always the status quo f_0 with utility $u(i, f_0) = 0$ for every player i, therefore the value as sum of utilities should also be zero.

In some models it is assumed that characteristic functions are superadditive, i.e. $v(S \bigcup T) \geq v(S) + v(T)$ for all $S, T \subseteq N$ with $S \bigcap T = \emptyset$. This paper does *not* make this assumption, as the value of some coalitions may be negative, and in reality voting majorities can often secure a higher value for themselves than they could ever get from consensus.

It is also sometimes assumed that possible externalities of coalition formation are not taken into account in the characteristic function. If the externalities need to be modeled explicitly, the partition function form may be helpful (see Thrall & Lucas, 1963). Our definition of $v(S)$ does not assume the absence of externalities, but takes them into account as follows. If S is a majority, it does not matter how the other players are partitioned. However, for a minority S, the outcome does depend on whether (and which) majority is formed from the other players. The value of a minority (the value it can secure for itself) is therefore defined as the *minimum* result of all possible outcomes, thus.

Imputations and effectiveness

A payoff vector $(x_i)_{i \in N}$ of real values is called an *imputation* if it satisfies conditions of

1. individual rationality: $x_i \geq v(\{i\})$ for $i = 1, 2, \ldots, n$, and
2. group rationality: $\sum_{i=1}^{n} x_i \geq v(N)$.

(Modified from Lucas, 1971:499). The condition of group rationality is the same as saying that x is "Pareto optimal" (i.e. Shubik, p.296).

Because it is often assumed that the total payoff can not exceed the value created by the grand coalition (x is N-effective), the condition of group rationality boils down to an *equality* relation.

A payoff vector x is called S*-effective* if

$$\sum_{i \in S} x_i \leq v(S).$$

Thus S "is not asking for more than its value" (Lucas, 1971:499) or is not paying its members more than the total amount it can secure independently.

4.2 Solution Concepts

In coalitional game theory, a number of solution concepts have been developed to calculate the set of *payoffs* that is either the most likely, stable, or fair in a given model. However, in our present model of the European Commission, we are equally (if not more) interested in the *proposal* that will be chosen. The reason is that the Commission's decisions on proposals are only one part of a larger European decision making process involving the Council, European Parliament, and lobbyists.

The following subsections review the standard solution concepts of the core and the ε-core, and extend these concepts to include the mechanism of proposals.

4.2.1 The core

The core is the set of all *imputations* that "leave no coalition in a position to improve the payoffs to all of its members" (Shubik p.299). These are the imputations x such that:

$$\sum_{i \in S} x_i \geq v(S) \qquad \text{for all } \ S \subseteq N.$$

It is also assumed that the grand coalition can not distribute more than $v(N)$ among the players as payoffs. Thus, all x in the core are N-effective. Together with the condition of Pareto optimality (or group rationality) for imputations, this gives

$$\sum_{i \in N} x_i = v(N).$$

Rapoport (p. 114-115, 1970) makes it clear that the core assumes the grand coalition (consensus) will form, whereas other solution concepts such as the kernel, bargaining set, and nucleolus, may exist without consensus.

4.2.2 Solution concepts extended

In coalitional game theory, a solution concept is essentially a function. For a particular game setup, it results in a set of payoffs that fit the conditions:

$$\langle N, F, u, v, \rangle \rightarrow X$$

Here X is a set of payoff vectors $x \in \Re^n$ (for example the core). N is the set of players, F the set of possible proposals, and u the utility function on N and F. v is the value function on C (the set of coalitions) and depends on u, F, and the majority voting rule.

We would like to extend this function to also provide the outcome proposal(s):

$$\langle N, F, u, v, \rangle \rightarrow O \ni (X, P) \ , \ X \subseteq \Re^n \ , \ P \subseteq F$$

Here the solution of the game is an *outcome pair* of a set X of payoff vectors and a set P of proposals.

4.2.3 The core extended

To extend the core, we first define the *maximizing proposal of a majority coalition* $p(S) \in F$ as the proposal that maximizes the value of the coalition $S \in M$. Because the maximizing proposal might not be unique, we also define the proposal *set* $P(S)$ of a majority coalition $S \in M$ as the *set of* proposals that each maximize the coalition's value.

The *proposal core* can now be defined as

$$P = \begin{cases} P(N) & \text{if core } X \neq \emptyset; \\ \emptyset & \text{if core } X = \emptyset. \end{cases}$$

Here $P(N)$ is the *maximizing proposal set* of the *grand coalition*, and $\emptyset$ means a set is empty.

It would be convenient to have a formula for calculating the core X directly from the proposal core P, or vice versa, but such a formula is not very straightforward.

4.2.4 The ε-core

The ε-core is related to the core concept. The idea is that a core may be created or increased by placing a cost or tax on the formation of coalitions, and be made to shrink or disappear by subsidizing coalition-forming (Shubik, p.305).

Two ways of calculating the cost have been suggested (Shubik p.305): one cost for a whole coalition (strong ε-core) or a cost per coalition member (weak ε-core). The *strong ε-core* is the set of N-effective, Pareto optimal payoffs x such that

$$\sum_{i \in S} x_i \geq v(S) - \varepsilon \text{ for all } S \subseteq N.$$

Here ε is the *cost* of forming a coalition (other than the grand coalition), and is therefore taken ≥ 0. A high ε creates a larger core, thus a larger set of payoff vectors for which no coalition can afford to break away from consensus.

The solution concept of the ε-core is especially interesting for the present case, because there seems to be a (subjective) value of reaching consensus in the European Commission. If we decide to use ε for modeling the added value of consensus, we can readily infer some characteristics of this value that fit well with reality.

First, whereas there is subjective (added) value in reaching consensus, there is no such value for forming a majority coalition to vote. This is because taking a vote implies similar unsurmountable differences as the situation of nonagreement.

Second, the added value of consensus should be comparable to other sources of utility (i.e. from the proposal itself). Players make a tradeoff between their direct interests and their interest in reaching consensus.

Third, the value of consensus is not (only) "paid out" to each player separately, but this value may also be *transferred* through the informal social standing system described earlier. The ε-core can easily be used in the definition of the proposal core, thus replacing the core X without any complications.

5 Conclusions and Further research

The main purpose of this paper was to construct a useful model of decision making between members of the European Commission, and open up new perspectives for further research in this area. The model presented in this paper has a number of interesting characteristics.

Our model is able to describe peculiar institutions (such as the European Commission) that have a decision rule somewhere *in between* voting and unanimity: a general motivation to reach consensus, but occasionally voting if there is too much difference between strongly preferred outcomes. It also uses less (restrictive) assumptions about utility functions (or preferences) than many existing models of EU decision making.

The model is not capable of representing bureaucratic inefficiency. In particular, the anecdotal accounts of decision-making by committee, where a mutually acceptable and yet still over-all suboptimal decision is arrived upon. Note that this anecdotal evidence about committee decision-making is different yet again than Klimek (et al. 2009) who account for bureaucratic inefficiency as a lack of policy convergence, not a lack of effective decision-making.

Because the model explicitly includes different formulations of proposals as an aspect of the decision outcome, it can be linked to models of other European institutions. For example, the Commission, lobbyists, Council and Parliament (if applicable) may each have a set of proposals that is politically feasible in their respective sub-models. Suppose a proposal can only become law if it is proposed by the Commission, accepted by the Council and / or Parliament, and incorporates technical details held by lobbyists. Then the set of feasible laws in the super-model may be defined as the area where the outcomes of the sub-models overlap. This is just one way of using proposals to link models together, and is offered as a suggestion for further research.

Another advantage of the presented model is that a quantitative analysis of Commission voting history may provide an estimate for ε, the (subjective) value of reaching consensus (relative to the utility of proposals). It would also be interesting to see if the motivation to reach consensus changes over time. In addition to the points made above, there are some more areas that may be explored in future research.

A major question is how exactly to determine the utility of a each possible formulation of a proposal, for each player. A players could be seen as an agent for several principals, such as national interests, portfolio interests, industry interests, interests of political parties and ideologies, or the pan-European interests that the Commission is supposed to serve.

For calculating the outcomes from the utilities, the current procedure would be to use linear programming to calculate the (payoff) core. If it exists, the proposal core also exists, and is simply the set of proposals that yield maximum utility for the grand coalition. Although no straightforward formula was found for calculating the core X from the proposal core P (and vice versa), such a formula may be theoretically interesting as well as practical for calculations.

Finally, the proposed model only deals with one "issue" needing legislation at a time, and uses transferable utility to enable players to compromise more on one issue in return for less compromise on another issue. It might be possible and beneficial to formulate a somewhat similar model incorporating bilateral deals between players, as has already been done in modeling Council voting (i.e. Dijkstra et al., 2008). Further, additional research is needed on developing coalitions for multipart and multi-issue legislation. The multi-issue representation of coalition games might be of assistance here (Shoam & Leyton-Brown). Alternatively, extensions of Shapley's value might be useful.

References

Bilbao, J. M., Fernandez, J. R., Jimenez, N., & Lopez, J. J. (2002). Voting power in the European Union enlargement. European Journal of Operational Research, 143(1), 181-196.

Bomberg, E. & Stubb, A. (2003). The European Union: How does it work? New York: Oxford University Press.

Dhillon, A (2005). Political parties and coalition formation. Group Formation in Economics: Networks, Clubs and Coalitions, edited by G. Demange & M. Wooders, Cambridge University Press: Cambridge.

Dijkstra, J., Van Assen, M. A. L. M., & Stokman, F. N. (2008). Outcomes of collective decisions with externalities predicted. Journal of Theoretical Politics, 20(4):415-441.

Doring, H. (2007). The composition of the college of commissioners: Patterns of delegation. European Union Politics, 8(2), 207-228.

Egeberg, M. (2006). Executive politics as usual: Role behaviour and conflict dimensions in the College of European Commissioners. Journal of European Public Policy, 13(1), 1-15.

Hammond, T. H. (1996). Formal theory and the institutions of governance. Governance, 2, 107-185.

Hooghe, L. (1999). Consociationalists or Weberians? Top commission officials on nationality. Governance, 12(4), 397-424.

Klimek, P., Hanel, R. & S. Thurner (2009). Parkinson's Law quantified: Three investigations on bureaucratic inefficiency. Journal of Statistical Mechanics: Theory and Experiment, P03008.

Lucas, W. F. (1971). Some recent developments in n-person game theory. SIAM Review, vol. 13, No. 4, October 1971.

McKelvey, R. D. (1975). Intransitivities in multidimensional voting models and some implications for agenda control. Journal of Economic Theory, vol. 12, pp. 472-482.

Osbourne, M. J. and A. Rubinstein (1994). A course in game theory. The MIT Press: Cambridge, Mass.

Passarelli, F., & Barr, J. (2006). Preferences, the agenda setter, and the distribution of power in the EU. Social Choice and Welfare, 28(1), 41-60.

Rapoport, A. (1970). N-person game theory: Concepts and applications. Dover Publications: New York.

Putnam, R. D. (1988). Diplomacy and domestic politics: The logic of two-level games. International Organization, Vol. 42, No. 3 (Summer, 1988), 427-460.

Shoam, Y. & K. Leyton-Brown 2008), Multiagent systems: algorithmic, game-theoretic, and logical foundations. Cambridge University Press: Cambridge.

Shubik, M. (1981). Game theory models and methods in political economy. Handbook of Mathematical Economics, 1, 285-330.

Spence, D. (2006). The European Commission, 3rd edition, John Harper Publishing.

Stokman, F., & Thomson, R. (2004). Winners and losers in the European Union. European Union Politics, 5(1), 5-23.

Thrall, R. M. & Lucas, W. F. (1963). N-person games in partition function form. Naval Research Logistics Quarterly, Vol. 10, No. 4, 281-29.

Trondal, J. (2008). The anatomy of autonomy: Reassessing the autonomy of the European Commission. European Journal of Political Research, 47, 467-488.

Tsebelis, G. (2002). Veto Players: How Political Institutions Work, Princeton University Press: Princeton.

Tsebelis, G., & Garrett, G. (1996). Agenda setting power, power indices, and decision making in the European Union. International Review of Law and Economics, 16(3), 345-361.

van Damme, E. (1998). On the state of the art in game theory: An interview with Robert Aumann, Games and Economic Behavior, 24, 181-210.

van Overveld, P. (2008). Countering threats to drinking water quality. Thesis, Department of Multiactor Systems, Delft University of Technology.