

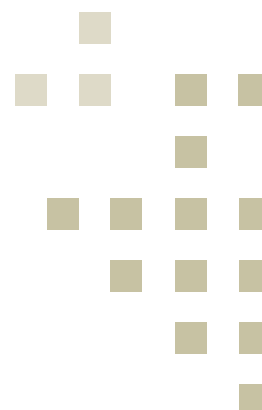
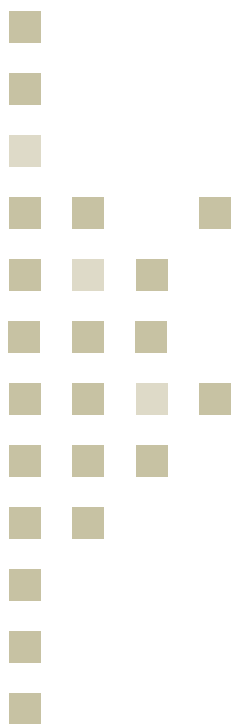


# [662] Paper

## Majority Rules and Incentives

International voting affects domestic policies

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# Majority Rules and Incentives

## International voting affects domestic policies\*

Bård Harstad

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**[Abstract]** A "majority rule" defines the number of club-members that must approve a policy proposed to replace the status quo. Since the majority rule thus dictates the extent to which winners must compensate losers, it also determines the incentives to invest in order to become a winner of anticipated projects. If the required majority is large, the members invest too little because of a hold-up problem, if it is small, the members invest too much in order to become a member of the majority coalition. To balance these opposing forces, the majority rule should increase in the level of minority protection (or enforcement capacity) and the project's value but decrease in the ex post heterogeneity. Strategic delegation turns out to be sincere exclusively under this majority rule. Externalities can be internalized by adjusting the rule. With heterogeneity in size or initial conditions, votes should be appropriately weighted or double majorities required. The analysis provides recommendations for Europe's future constitution.



## 1. Introduction

If everyone agrees, collective decisions are taken unanimously. Unfortunately, whenever some gain from a public project, others typically lose. A common solution is to apply a "majority rule", defined as the fraction of agents that must approve a policy proposed to replace the status quo. The majority rule thus determines the extent to which winners of a project must compensate losers. Whether an agent really *is* a winner depends on her action and preparation in advance. In this paper, I investigate the incentive to make such investments and find how it is distorted by the majority rule. Moreover, I argue that the concern for incentives should be decisive when voting rules are chosen, and the optimal majority rule is characterized.

While this problem is quite general, the debate on majority rules might currently be hottest in Europe. The European Council applies different majority rules to different issues. Procedural questions can be taken by simple majorities, issues related to the common market require a qualified majority, and foreign policies unanimity. This raises the *positive* question of why majority rules differ across issues.<sup>1</sup> Historically, majority rules have been debated in the EU since it was founded. The Treaty of Rome (1957) intended to use majority voting for most issues, but the Luxembourg Compromise (1966) effectively gave each member a veto for issues of "vital interest". After a halt in the integration process, the Single European Act (1986) established qualified majority voting for issues related to the internal market. The range of issues to which majority voting applies was further extended by the Maastricht Treaty (1992) and the Treaty of Nice (2000). Last summer, the European Convention completed its Draft for the EU's future constitution. The Convention suggests that qualified majority voting should be extended to several issues that required unanimity in the past. Furthermore, "qualified majority" should be redefined from 71% to 60%. The Draft has led to fierce negotiations which seem to continue throughout 2004. It is thus both important and timely to raise the *normative* question of what are the optimal majority rules.<sup>2</sup>

A typical project in the EU is to liberalize its common market. Quite soon, we might see additional directives on the liberalization of public utilities (electricity, telecom, mail, transport). Though the EU has already taken several steps towards such liberalization, much remains to be done. CEPR (1999, p.1) reports that *full liberalization of the European electricity market will provide substantial gains amounting to 10-12 billion Euro per annum, or twice as much as the gains anticipated from the opening already agreed*. It is evident that different countries have quite different values of such liberalization; the UK, for example, supports it solidly. This is not accidental, but thanks to Thatcher's privatization effort in the 1980s. Similarly, a country's future value of liberalization depends on its policy today. CEPR (1999) criticizes countries for different standards, bad market institutions, public ownership and state aid. Unless the member countries make the appropriate policies today, liberalization might be impossible tomorrow. But do countries have right incentives to invest, or do they fear to be held up by others? How do the incentives depend on the majority rule? What determines the optimal rule?

This paper provides a three-stage model of collective decisions. At the constitutional

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<sup>1</sup>For the current rules, see e.g. Hix (2004).

<sup>2</sup>For the Convention's suggestion, see <http://european-convention.eu.int>.

stage, members of a club select a majority rule. At the investment stage, each member makes some non-contractible investment which thereafter affects her value of the anticipated public project. The values may also be affected by individual and aggregate shocks. At the legislative stage, a majority coalition is formed which proposes a set of side payments and whether the project should be implemented. The proposal is executed if approved by the required majority.

Solving the game by backward induction, we can derive the legislative outcome, equilibrium investments and the optimal majority rule. It is shown that when transaction costs vanish, the project is implemented if and only if it is socially efficient *ex post* - whatever is the majority rule. This is because the majority coalition captures the entire value of the project if it is implemented, while it fully expropriates the minority in any case. This result resembles the Coase Theorem, and it suggests that the importance of majority rules may not be to select the right projects.

At the investment stage, the members face two strategic concerns. On the bad side, investments reduce bargaining power. Members happening to be winners of the project become very eager to see it implemented and, in equilibrium, they are expropriated or must compensate those benefiting less. This is a multilateral hold-up problem which discourages investments. On the good side, investments increase a member's probability of obtaining political power, since the winning majority coalition will consist of the members most in favor of the project. This is valuable, since it is the majority coalition that determines the distribution of surplus. If the majority rule is small, political power is very beneficial, since few losers need to be compensated and a large minority can be expropriated. To improve the chances of become a member of the majority coalition, each member invests too much. If the majority rule is large, political power is less attractive, the hold-up problem dominates, and members invest too little. To balance these two opposing forces, the majority rule should depend on the club's enforcement capacity (or minority protection), and the particular project's expected value and heterogeneity in values.

Besides providing insight itself, this simple model is employed as a framework for studying several related issues. In particular, each member may be tempted to strategically delegate bargaining authority to either a reluctant delegate to increase bargaining power, or to an enthusiastic delegate to gain political power. It is shown that delegation is sincere exclusively at the optimal majority rule. Externalities related to the investments can be internalized by adjusting the majority rule. The legislative game is generalized to discuss the effects of bicameralism, presidency and rotating political representation (as suggested by the European Convention). If members are of different size, first-best investments are implemented by either weighted votes (the weights should be regressive in a member's size) or double majorities, in combination with rotating political representation (larger members should be represented with larger probability). Heterogeneity in initial conditions generates asymmetric and suboptimal investment levels, though also this problem can be solved by either weighting the votes or using double majorities.

The model is general and relevant for a wide range of collective decisions in both public economics and corporate governance.<sup>3</sup> Still, the European Union appears to fit tightly to the description. The policy space in the EU is typically unidimensional (further

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<sup>3</sup>See the final section for some examples.

integration vs. the status quo) and decisions are taken by a combination of voting, negotiations and side payments. In line with the model, Kirchmer (1992, p. 134) describes that package deals *are built on coalitions among like-minded governments and often involve trade-offs or side-payments*. As he notices, side payments can be implicit in the form of logrolling, issue linkages or by just redefining the project. Or, they can be explicit: "Structural funds" arose to compensate the UK for the Union's agricultural expenditures (in 1969), they were doubled to convince the Mediterranean countries to accept the Single European Act (1986), and "cohesion funds" were invented to compensate poorer members for the tough financial criteria imposed by the Maastricht Treaty (1992).<sup>4</sup> When applied to the EU, several of the model's predictions are supported. On the normative side, the analysis provides recommendations for its future constitution.

The theoretical debate on majority rules is certainly older than the European Union. Already Rousseau (1762) contrasted unanimity to rules requiring smaller majorities, and Condorcet (1785) is famous for his Jury Theorem; advocating the simple majority rule as the best way of aggregating information. More than a century ago, Wicksell (1896) advocated unanimity as the only rule guaranteeing Pareto improvements. However, Buchanan and Tullock (1962) argued that the majority rule should trade off the costs of expropriating the minority (emphasized by Wicksell) against "decision-making costs", increasing with the majority rule. They did not, though, clarify what these decision making costs are. Recently, and more formalized, Aghion and Bolton (2003) take the winners' wealth constraints into account, and minimize the costs of expropriating the minority subject to the budget constraint in order to derive the optimal majority rule. A similar trade-off is studied by Aghion, Alesina and Trebbi (2004) who, in addition, point to the *costs* of compensating losers.<sup>5</sup>

As discussed by Mueller (1989), controversies in the literature on majority rules often arise from different assumptions on whether side payments are allowed, and at which transaction costs. Some transaction costs are typically assumed since otherwise, the Coase Theorem holds and the majority rule becomes irrelevant for the selection of projects (as in this paper). A larger caveat with the traditional literature, in my view, is that individual values are just exogenously given. Whether you are a winner or a loser of the project is simply drawn by Nature. The main contribution of this paper is to let the members influence their future value of the project. The incentives to invest depend on the majority rule, and the majority rule should be set such that the incentives are right.

Hold-up problems are certainly studied elsewhere in the literature. Suggested institutional remedies include appropriate allocations of ownership (Grossman and Hart, 1986),<sup>6</sup> authority (Aghion and Tirole, 1997) and status quo (Aghion, Dewatripont and Rey, 1994). In international contexts, the importance of the hold-up problem is recog-

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<sup>4</sup>For more on this, see George and Bache (2001).

<sup>5</sup>Other aspects of the majority rule are also studied. An early strand of literature (surveyed by Enelow, 1997) emphasizes Condorcet cycles, and argues that the majority rule should be sufficiently large to prevent cycles. Barbera and Jackson (2004a) examine majority rules that are stable and induce agents to select themselves as a decision rule. Maggi and Morelli (2003) observe that majority rules must be enforced and derive the best enforceable majority rule. The literature is far too large to survey in this paper - see instead Chapters 4-8 in Mueller (1989). To my knowledge, no other paper focuses on incentives.

<sup>6</sup>Hart and Moore (1990) study optimal ownership in a multilateral hold-up problem.

nized by e.g. McLaren (1997) who shows how prior adjustments to trade liberalization may dramatically reduce a country's bargaining power. Wallner (2003) similarly suggests that a hold-up problem hurts potential entrants to the EU, which undertake reforms prior to acceptance. The present paper contributes to the literature on the hold-up problem by showing how multilateral hold-up problems can either arise or be mitigated, depending on the particular majority rule.

The effects of political regimes on incentives are discussed by several recent papers. Persson and Tabellini (1996) study how regional moral hazard depends on whether inter-regional distribution is decided by voting or bargaining. Anderberg and Perroni (2003) argue that the majority's power to choose taxes induces agents to imitate the majority. Relative to unanimity, majority voting can therefore support an equilibrium where a small majority save, since it is then time-consistent for them to select a small tax on capital. In a context with incentives, the particular choice of majority rule is, to my knowledge, only discussed by Persico (2004). He focuses on searching increasing information on the project's common value. The probability of becoming a pivotal voter determines the incentives to search for such information. These incentives are vastly different from the incentives to invest in private values, studied here.

This paper is also related to an entire literature on delegation. The incentive to appoint a *reluctant* delegate in order to strengthen bargaining power is recognized already by Schelling (1956). On the other hand, Baron and Ferejohn (1989) find that legislators with low bargaining power have better chances of becoming coalition members. Chari, Jones and Marimon (1997) discuss how this induces voters to elect representatives too *enthusiastic* about the public good. Brueckner (2000) finds these incentives to depend on the extent to which unanimity is required. I take his point further by investigating how the majority rule affects the incentives to delegate. In this paper, members may want to delegate in order to gain either bargaining power or political power. These opposing incentives are balanced by the optimal majority rule.

The remainder of the paper is organized as follows. The next section presents a simple model of collective decisions. Section 3 solves this game by backward induction: incentives are found to depend on the majority rule, and the optimal rule is characterized. This workhorse model is then employed to discuss strategic delegation, externalities, legislative games, and heterogeneity in size and preferences. To review, Section 5 contrasts all the results to the case without side payments. Future research is outlined in the final section.

## 2. The Model

A club is a set  $I$  of members. On day 0, the constitutional stage, the members select a majority rule  $m \in (0, 1]$ , defining the required fraction of members that must approve a policy on day 2 proposed to replace the status quo. Since all members are identical at this stage, they all prefer the same majority rule.

On day 1, the investment stage, each member  $i \in I$  makes some non-contractible investment  $x_i$  at the private cost  $c(x_i)$ . The function  $c$  is increasing, convex, and continuous differentiable. The purpose of this investment is to increase the benefit or reduce the cost of a particular public project that may be undertaken on day 2. Formally, after the



investments have been chosen, member  $i$ 's net value of the project is drawn to be

$$v_i = x_i + \epsilon_i + \theta, \quad (2.1)$$

where  $\epsilon_i$  and  $\theta$  are some individual and aggregate shocks, respectively.<sup>7</sup> The  $\epsilon_i$ s are independently drawn from a uniform distribution with mean zero and density  $1/h$ :

$$\epsilon_i \text{ iid } \sim U \left[ -\frac{h}{2}, \frac{h}{2} \right].$$

If all members invest the same amount, the realizations of the  $\epsilon_i$ s determine the heterogeneity in preferences. If  $I$  is finite, the distribution of the  $\epsilon_i$ s can take many forms, making the analysis quite complex. To simplify, I assume that there is a continuum of members,  $I \equiv [0, 1]$ , such that the distribution of the  $\epsilon_i$ s is deterministic and uniform.<sup>8</sup> Then,  $h$  measures the ex post heterogeneity in values.<sup>9</sup>

The state of the world  $\theta$  measures both the average and the expected value of the project without investments.  $\theta$  may be negative, since it includes the cost of the project. Together with the investments,  $\theta$  determines whether the project is worthwhile implementing on day 2. To get explicit solutions, also  $\theta$  is assumed to be uniformly distributed.<sup>10</sup>

$$\theta \sim U \left[ a - \frac{\sigma}{2}, a + \frac{\sigma}{2} \right].$$

$a$  is the value of an average project (without investments), and  $\sigma$  measures the standard deviation in the aggregate shock.<sup>11</sup>

After the members' values have been observed by everybody, the legislative stage begins on day 2. I separate the coalition formation stage, the negotiation stage and the voting stage. First, the majority coalition is formed. In line with Riker (1962), I assume that a randomly drawn initiator (or president) selects a *minimum winning coalition*  $M \subset I$  of mass  $m$  to form the majority, and that this is all the initiator is doing.<sup>12</sup> This is not important; the initiator will simply select the unique core at this stage. Thereafter, the members of  $M$  negotiate a political proposal. All members of the majority coalition must agree before the proposal is submitted for a vote.<sup>13</sup> A proposal specifies whether the project should be implemented as well as a set of individual transfers or taxes  $t_i$ . These taxes must fulfill the budget constraint, which is  $\sum_{i \in I} t_i = 0$  if transaction costs are negligible. The cost of the project, remember, is included in parameter  $\theta$ . Third, the vote takes place. Two conditions must be met for the proposal to be implemented. Crucially,

<sup>7</sup>For simplicity, I let the different effects be additive. Any multiplicative effect,  $\theta x_i$  or  $\epsilon_i x_i$ , would give the same results.

<sup>8</sup>I here apply the "standard abuse of the law of large numbers", since the distribution of idiosyncratic shocks never can be deterministic. See Green (1994) for more on this.

<sup>9</sup>Footnotes 32 and 48 discuss how the results would change if  $I$  were finite.

<sup>10</sup>Footnotes 28, 29 and 54 discuss the outcome if the shocks were bell-shaped distributed.

<sup>11</sup>To be precise, the variance of  $\theta$  is  $\sigma^3/12$ .

<sup>12</sup>Section 4.3 relaxes both these assumptions. Then,  $M$  might be of a different size than  $m$ , and the initiator may have agenda setting power.

<sup>13</sup>That only  $M$  can make political proposals might reflect what Baron (1989) labels "coalition discipline". Without such discipline, he argues, the mass of  $M$  is likely to be larger than  $m$ . This is indeed proven by Groseclose and Snyder (1996).



where  $x$  denotes average investment.<sup>15</sup> Thus, the probability  $q$  that the project turns out to be good ex post is increasing in  $x$ :

$$q(x) \equiv \int_{-x}^{a+\frac{\sigma}{2}} \frac{d\theta}{\sigma} = \frac{1}{\sigma}(a+x) + \frac{1}{2}.$$

Under the optimal selecting rule (3.1), the optimal effort level at the investment stage is determined by

$$\begin{aligned} \text{Max}_x E \int_{-x}^{a+\frac{\sigma}{2}} (\theta + x + \epsilon_i) \frac{d\theta}{\sigma} - c(x) \Rightarrow \\ c'(x^*) = q(x^*). \end{aligned} \quad (3.2)$$

The second-order condition is  $\sigma c''(x^*) \geq 1$ , which I assume to be fulfilled.<sup>16</sup>

### 3.1. Majority Rule Irrelevance

Let us now solve the final legislative stage of the game. To maximize its surplus, any majority coalition  $M$  will ensure that all members of the minority  $N \equiv I \setminus M$  receive exactly their reservation utility of  $-r$ . This is achieved by setting taxes such that

$$t_i = v_i + r \quad \forall i \in N$$

if the project is proposed, and by setting  $t_i = r \forall i \in N$  otherwise. If any  $i \in N$  obtained less utility, that member would not accept the policy and the majority would receive nothing. If any  $i \in N$  obtained more than  $-r$ , that member could be taxed more and these revenues could be distributed within the majority. Thus, the majority coalition is taxing a member  $i \in N$  more if  $v_i$  is large, since  $i$  is then more willing to accept the proposal. This negative effect of a larger  $v_i$  on  $t_i$  may be interpreted as a loss of bargaining power, and it completely nullifies the positive direct effect of  $v_i$  on  $u_i$ : for  $i \in N$ ,  $u_i = -r$ , notwithstanding  $v_i$ .

As discussed in the Introduction, most of the literature on majority rules presumes that transaction costs arise whenever some members are taxed. Before I let them vanish, I will now introduce small transaction costs, for two reasons. First, this allows us in a simple way to relate Proposition 1 below to the existing literature. Second, it allows us to derive Axelrod's (1970) hypothesis of minimum *connected* winning coalitions, meaning that  $M$  consists of those  $i$  with the highest  $v_i$  (if the project is good). This coalition formation is simply assumed by e.g. Aghion and Bolton (2003). Many kinds of transaction costs give us the same result,<sup>17</sup> but for simplicity I follow Aghion and Bolton (2003). For each

<sup>15</sup>For this and similar integrals to be defined,  $v_i$  is assumed to be piecewise continuous in  $i$ .

<sup>16</sup>The optimal  $x^*$  is only implicitly defined by (3.2). If  $c(x) = kx^2/2$ , the explicit solution for  $x^*$  is  $x^* = (a + \sigma/2) / (k\sigma - 1)$  and the second-order condition is  $1 - k\sigma \leq 0$ . If instead  $1 > k\sigma$ , then (3.2) shows the *ArgMin* w.r.t.  $x$ .

<sup>17</sup>To be precise, any pair of transaction cost functions for compensation and taxes, where the deadweight loss is (weakly) convex in the amount of transfers, leads to the following results. The results also hold whenever it is no more costly (deadweight loss) to tax (compensate) the majority (minority) than the minority (majority).

unit expropriated by the minority, a fraction  $\lambda$  measures the deadweight loss. The total surplus available for the majority is then

$$\int_M v_i di + \int_N (v_i + r)(1 - \lambda) di, \quad (3.3)$$

if the project is proposed.<sup>18</sup> Otherwise, the total surplus for the majority is

$$\int_N r(1 - \lambda) di. \quad (3.4)$$

The allocation of this surplus is determined by multilateral negotiations within the majority coalition. If the negotiations fail, the status quo remains. Though it might not be obvious how to define the bargaining game with a continuum of players, I let the outcome be characterized by the Nash bargaining solution for a finite number of players.<sup>19</sup> This outcome coincides with the Shapley value when all coalition members have veto power, and it is a likely outcome of non-cooperative bargaining.<sup>20</sup> It ensures that all members of the majority coalition receive the same surplus. This is achieved when coalition members with large  $v_i$ s subsidize coalition members with lower  $v_i$ s. Intuitively, a coalition member with a high value  $v_i$  has correspondingly low bargaining power, since she is eager to implement the project. Other members are then able to hold up  $i$  by requiring side payments to accept the project. As for bilateral negotiations, the value of cooperation is equally shared. As were the case for minority members, also majority members lose bargaining power when  $v_i$  is large, and this negative effect neutralizes the positive direct effect of  $v_i$  on  $u_i$ : for  $i \in M$ ,  $u_i$  is the same, notwithstanding  $v_i$ .

If the initiator does not find implementing the project worthwhile, all minority members will be taxed by  $r$ , and the majority's surplus (3.4) is independent of the composition of the majority coalition. Suppose then that the initiator selects coalition members randomly. If the project is to be implemented, instead, any initiator prefers to form the

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<sup>18</sup>It is here implicitly assumed that  $v_i + r \geq 0 \forall i \in N$ .

<sup>19</sup>Nash's axiomatic theory for bilateral bargaining extends unchanged to multilateral situations. Since the default outcome gives zero utility for all, the Nash bargaining outcome follows from maximizing the Nash product

$$\begin{aligned} \text{Max}_{\{t_i\}_i} \prod_{i \in M} (v_i - t_i) \quad \text{s.t.} \quad \sum_{i \in M} t_i &= -\sum_{i \in N} (1 - \lambda)t_i \\ \text{and s.t.} \quad v_i - t_i &\geq -r \quad \forall i \in N, \end{aligned}$$

if the number of agents is finite and their utilities transferable. This ensures that all agents in the majority coalition receive the same utility  $v_i - t_i$ . Utilities are transferable within the coalition only if there are negligible transaction costs in transferring surplus within the majority. This is assumed by Aghion and Bolton (2003).

<sup>20</sup>In general, there exist multiple subgame-perfect equilibria to multilateral bargaining situations. Krishna and Serrano (1996) allow each player to exit with its share of the surplus following some proposed allocation. Then, they obtain a unique equilibrium outcome coinciding with the multilateral version of the Nash bargaining solution when the discount factors between successive offers approach one (see their Theorem 1'). In this outcome, everyone receives the same utility if utility is transferable. A similar justification is provided by Hart and Mas-Colell (1996).

majority coalition with the members having the highest possible values  $v_i$ s, since this maximizes (3.3).<sup>21</sup> These "winners" of the project do not need to receive (much) compensation to approve the project; they are instead ready to compensate others.<sup>22</sup> Thus, there is a positive effect of  $v_i$  on  $i$ 's political power. If the members undertake the same investment  $x$  on day 1, individual values on day 2 will be uniformly distributed with the mean  $\theta + x$  and density  $1/h$ . The majority coalition will consist of the upper  $m$  fractile of this interval, i.e.  $[v_m, \theta + x + h/2]$ , where<sup>23</sup>

$$v_m \equiv \theta + x + h \left( \frac{1}{2} - m \right).$$

Hence, if the project is going to be implemented, member  $i$ 's political power is given by

$$\begin{aligned} i &\in N \text{ if } v_i < v_m \text{ and } m < 1 \\ i &\in M \text{ if } v_i \geq v_m \text{ or if } m = 1. \end{aligned}$$

Thus, the majority coalition consists of members with similar preferences (in line with Axelrod, 1970), namely those with the highest value of the public project.<sup>24</sup>

By comparing (3.3) and (3.4), the majority coalition will implement the project if and only if

$$\begin{aligned} \int_M v_i di + \int_N (1 - \lambda)(v_i + r_i) di &\geq \int_N (1 - \lambda)r_i di \Rightarrow \\ \int_M v_i di + \int_N (1 - \lambda)v_i di &\geq 0. \end{aligned}$$

Since the lowest values  $v_i$  are discounted by  $(1 - \lambda)$ , the majority may implement the project even if it is not socially optimal. Partly for this reason, Wicksell (1896) recommended that decisions should be taken by unanimity. However, Buchanan and Tullock (1962) argued that this would create large decision-making costs, though they did not specify what these costs might be. Aghion and Bolton (2003) assume that wealth constraints make the project impossible to finance if all losers must be compensated. As all

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<sup>21</sup>This coalition of "winners" is thus the unique core of the game (when side payments cannot be promised, or the coalition shares the surplus equally).

<sup>22</sup>To some extent, the winners' surplus could be expropriated even if these were in the minority, but parts of these tax revenues would disappear as transaction costs. Moreover, as in the model by Aghion and Bolton (2003), there might be some binding limit  $w$  on how large the taxes can be, making the total surplus for the majority equal to  $\int_M v_i di + \int_N w di$ . Such a limit could be interpreted as another form of transaction costs. The surplus expropriated from the minority would then be fixed  $w(1 - m)$ , while the coalitions' surplus would increase in each  $v_i$ ,  $i \in M$ . Even with an arbitrarily small probability for such a limit on taxation, the initiator strictly prefers to select the members with the highest  $v_i$  as coalition members.

<sup>23</sup>The initiator may of course have a low value of the project, since she is randomly drawn from the entire population, but her size is negligible.

<sup>24</sup>This result is similar to the result of Ferejohn, Fiorina and McKelvey (1987), who find that the majority coalition consists of those legislators with the lowest cost of their project.

transaction costs vanish, however, the condition for implementing the project becomes

$$\lim_{\lambda \rightarrow 0} \int_M v_i di + \int_N (1 - \lambda)v_i di = \theta + x \geq 0,$$

which coincides with the social optimal condition (3.1) - whatever the majority rule is! Without transaction costs, the majority coalition captures the project's entire value if it is implemented, while it fully expropriates the minority in any case. The majority will then only implement projects raising total welfare. That the selection of projects becomes efficient when transaction costs disappear indicates that the Coase Theorem has bite, even if only a fraction  $m$  of the members has political power.

**Proposition 1:** The selection of projects is always optimal when transaction costs vanish: the majority rule does not matter.

The irrelevance of the majority rule might not surprise practitioners in the European Union. Many decisions are made, even if unanimity is required for several issues. For example, the Single European Act was implemented despite the fact that the UK, which opposed the reform, could have vetoed it. Instead, the UK was compensated to accept. Similarly, issues are not certain to pass just because the majority rule is small. In the Uruguay round, a liberalization of the Common Agricultural Policy was rejected, despite the fact that France, as the single opponent, could not formally block the reform.<sup>25</sup> That the selection of projects is independent of the majority rule does not imply, of course, that countries are indifferent to which rules are used. The UK appreciates its veto, since it would not have been compensated without it. However, the irrelevance result above does suggest that the prime importance of the majority rule may not be to select the right projects. Instead, I argue, the effects on incentives might be much more important. To emphasize this, and to avoid somewhat ad hoc transaction costs, transaction costs are henceforth assumed to be negligible.

### 3.2. Equilibrium Investments

Having solved the legislative game, we are now ready to study the investment decision on day 1. When member  $i$  decides how much to invest  $x_i$  in order to increase her value  $v_i$  of the project, she realizes that a larger  $v_i$  affects her utility  $u_i$  in three ways. First, there is the direct effect, holding  $t_i$  constant. If the project is implemented, it is certainly better to be prepared. But  $t_i$  is not constant: it depends on  $v_i$ . Notwithstanding if  $i \in M$  or  $i \in N$ , a high  $v_i$  reduces  $i$ 's *bargaining power*, and  $t_i$  increases correspondingly. This is a multilateral hold-up problem which discourages investments. Notwithstanding  $v_i$ ,  $i$ 's utility becomes

$$u_i = \left\{ \begin{array}{ll} u_N \equiv -r & \text{if } i \in N \\ u_M \equiv \frac{\theta + x + r(1-m)}{m} & \text{if } i \in M \end{array} \right\} \quad (3.5)$$

if the project is good. Otherwise, the selection of  $M$  is random and each member's expected utility is zero.

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<sup>25</sup>For discussions of these cases, see George and Bache (2001).

As a third effect, whether  $i \in M$  or  $i \in N$  is also depending on  $v_i$ . A high  $v_i$  might increase  $i$ 's *political power* since, as argued above, a high  $v_i$  makes  $i$  a more attractive coalition partner, and less likely to be neglected as a minority member. Anticipating that the other members' values are uniformly distributed with mean  $\theta + x$  and density  $1/h$ ,  $i$  realizes that her probability of becoming a majority member is

$$p(x_i) = \Pr(v_i \geq v_m) = m + \frac{1}{h}(x_i - x), \quad (3.6)$$

if  $m < 1$  and  $\theta \geq -x$ .

Member  $i$ 's problem is

$$\text{Max}_{x_i} \int_{-x}^{a+\frac{\sigma}{2}} [p(x_i)u_M + (1 - p(x_i))u_N] \frac{d\theta}{\sigma} - c(x_i), \quad (3.7)$$

which gives the first-order condition

$$c'(\hat{x}_i) = \frac{q}{h}(u_M - u_N) = \frac{q}{h} \left( \frac{\tilde{v} + r}{m} \right), \quad (3.8)$$

where

$$q \equiv \int_{-x}^{a+\frac{\sigma}{2}} \frac{d\theta}{\sigma} = \frac{1}{\sigma}(a + x) + \frac{1}{2} \quad (3.9)$$

is the probability of a good project and

$$\tilde{v} \equiv E[\theta | \theta \geq -x] + x = \frac{1}{2} \left( a + x + \frac{\sigma}{2} \right) \quad (3.10)$$

is the expected value of a good project.<sup>26</sup> The second-order condition is trivially fulfilled.

Since the left-hand side of (3.8) increases in  $\hat{x}_i$ ,  $i$ 's optimal investment  $\hat{x}_i$  decreases with the majority rule  $m$ . With a smaller majority rule, there is less need to compensate

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<sup>26</sup>An interior solution is implicitly assumed for  $x_i$ . To be exact, however, (3.6) should be written as

$$p(x_i) = \left\{ \begin{array}{ll} 0 & \text{if } m + (x_i - x)/h < 0 \\ m + (x_i - x)/h & \text{if } m + (x_i - x)/h \in [0, 1] \\ 1 & \text{if } m + (x_i - x)/h > 1 \end{array} \right\},$$

which makes the solution to (3.7)  $x_i = x - h(1 - m) \Rightarrow p(x_i) = 1$  if  $m + (\hat{x}_i - x)/h > 1$ , where  $\hat{x}_i$  is defined by (3.8). This can clearly not be the case for all members (since then  $x_i = x$ ):  $x$  would increase until  $m + (\hat{x}_i - x)/h < 1$  and the solution becomes interior. Since  $p(x_i)$  is not concave in the entire interval, the local optimum  $\hat{x}_i$  should be compared to the other local optimum of  $x_i = 0$ , if this makes  $m + (x_i - x)/h < 0$ .  $x_i = 0$  is the better choice if  $qp(\hat{x}_i)(u_M - u_N) < c(\hat{x}_i)$ . If an increasing number of members choose  $x_i = 0$ ,  $x$  decreases, which in turn decreases  $q$  and  $u_M$  but increases  $p(\hat{x}_i)$ . If the overall effect on  $qp(\hat{x}_i)(u_M - u_N)$  is negative, we might have multiple equilibria where all agents either invest or not. The chance to have a good equilibrium (where members invest) decreases in  $m$ . If the overall effect is positive, we might have a mixed equilibrium where only some members invest. Though I rule out such cases here, see Section 4.5 where I allow members to be heterogeneous at the investment stage. Then, both corner solutions of  $x_i$  exist in equilibrium.

losers within the majority coalition and the number of minority members (which the majority can expropriate) is larger. Moreover, since the size of the majority coalition  $m$  decreases, the surplus per member of the coalition increases. For these reasons, if  $m$  decreases, the gains from political power increase, as do the incentives to invest. For a small  $m$ , the members may invest considerably in their race for political power. For a large  $m$ , the benefit of political power is low and the hold-up problem ensures that investments are low. The investment  $\hat{x}_i$  increases in the enforcement capacity  $r$ , because a larger  $r$  reduces the payoff of the minority, while it increases the surplus shared within the majority. This increases the value of political power. A smaller heterogeneity  $h$  further encourages investments, since even a marginally larger  $v_i$  then raises the chances of becoming a majority member quite considerably.

The first-order condition (3.8) shows that  $i$ 's investment increases in the probability  $q$  of a good project. Unless the project is good, the majority coalition will be random and the investment is useless in generating political power. For a fixed probability  $q$ , the incentives to invest also increase in the expected value  $\tilde{v}$  of a good project, since a larger  $\tilde{v}$  increases the value shared within the majority. This makes  $i$  more eager to become a majority member, and to increase this probability,  $i$  invests more. Combined, (3.8)-(3.10) show that  $i$ 's optimal investment  $\hat{x}_i$  increases in the project's average value  $a$  for two reasons: first because a larger  $a$  increases the probability  $q$  of the project being implemented, and second because a larger  $a$  increases the benefits  $\tilde{v}$  shared within the majority.  $i$ 's investment increases in the average level of investment  $x$  for the same two reasons, since  $x$  and  $a$  have identical effects on the project's value ex post. This raises the question of whether the equilibrium is stable. Consider the equilibrium defined by (3.8) and  $\hat{x}_i = x = \hat{x}$ , namely

$$c'(\hat{x}) = \frac{1}{2mh\sigma} \left( a + \hat{x} + \frac{\sigma}{2} \right) \left( a + \hat{x} + \frac{\sigma}{2} + 2r \right). \quad (3.11)$$

The equilibrium is stable indeed if  $c$  is sufficiently convex, which I henceforth assume.<sup>27</sup> We can then state:

**Proposition 2:** Equilibrium investment  $\hat{x}$  increases in the project's value  $a$  and the club's enforcement capacity  $r$  but decreases with ex post heterogeneity  $h$  and the majority rule  $m$ , if  $m < 1$ . If  $m = 1$ ,  $\hat{x} = 0$ .<sup>28</sup>

<sup>27</sup>The equilibrium is stable if  $\partial x_i / \partial x \leq 1$  in (3.8), which requires that  $c''(\hat{x}) \geq (a + \hat{x} + r + \sigma/2)/h\sigma m$ . If  $c'(0) = 0$  and  $a + \sigma/2 > 0$ , then the right-hand side of (3.8) lies above the left-hand side for  $x_i = x = 0$ . The first time the left-hand side crosses the right-hand side when  $x$  increases,  $c'$  crosses from below, which ensures that this fixed point is a stable equilibrium. That  $\partial x_i / \partial x \leq 1$  also guarantees that the parameters' effects on  $\hat{x}_i$ , for  $x$  fixed, are similar for the equilibrium  $\hat{x}$ . The explanation for this derives from implicitly deriving  $x_i$  w.r.t. an arbitrary parameter  $z$  where  $c'(x_i) = f(x, z)$ . This gives  $c''(x_i)(dx_i/dz) = f_x(dx/dz) + f_z$  and since  $dx_i/dz = dx/dz$  in equilibrium, this implies that  $dx/dz = f_z/(c''(x_i) - f_x)$ . Strict stability requires that  $\partial x_i / \partial x < 1 \Rightarrow c''(x_i) > f_x$ , which ensures that  $\text{sign}(dx/dz) = \text{sign}(f_z)$ .

<sup>28</sup>Note the discontinuity in  $\hat{x}$  when  $m$  increases to 1. While  $\hat{x}$  might be substantial even if  $m$  is just marginally smaller than 1,  $\hat{x}$  drops to zero if  $m$  becomes exactly 1. The reason is that if  $m = 1$ ,  $i$  is certain of becoming a majority member even if  $v_i$  is the lowest value by far. Political power is guaranteed and the hold-up problem ensures that  $i$  has no incentives to invest. If instead  $m < 1$ ,  $i$  knows that *some*



If the majority rule is large, investments are low and few projects turn out to be worthwhile implementing. Hence, a large  $m$  creates a status quo bias because members do not invest sufficiently. This contrasts the conventional wisdom (see e.g. Buchanan and Tullock, 1962), arguing that the status quo bias under a large majority rule is due to a less frequent selection of projects *ex post*. Then, the Convention's proposal of a reduced  $m$  should not have any effect before this rule is implemented in 2009. According to the model above, instead, the proposal should have immediate effects on incentives.

Proposition 2 suggests that the incentives to prepare for a project depend on the particular project's value. Information technology, for example, is one of the largest and fastest growing sectors of the EU, accounting for over 5% of Europe's GDP. In line with Proposition 2, CEPR (1999) reports that telecoms is also the most advanced network industry in terms of domestic deregulation.

### 3.3. The Optimal Majority Rule

At the constitutional stage, the members select the majority rule maximizing their expected utility, recognizing that the majority rule will affect the incentives to invest. Since all the members are identical at this stage, they simply prefer the optimal majority rule. To find this optimal majority rule, the equilibrium investment level  $\hat{x}$  in (3.11) should be compared to the socially optimal investment level  $x^*$  defined by (3.2). While this optimal investment level is obviously independent of the majority rule  $m$ , equilibrium investment is not. For a larger  $m$ , more project-losers must be included in the majority coalition, and these need to be compensated. Moreover, the minority exploited by the majority is smaller, and the majority's surplus is shared between more members. For these reasons, political power motivates little and the hold-up problem dominates. Members are then likely to underinvest. If the majority rule  $m$  is very small, the majority coalition consists of an elite where each member receives a large share of the total surplus. Few losers need compensation and a large minority can be expropriated. This makes political power very attractive, and its prospects encourage investments more than it is discouraged by the loss of bargaining power. Members are then likely to overinvest. These opposing forces are appropriately balanced if the majority rule makes  $\hat{x} = x^*$ . Comparing (3.2) and (3.11) reveals that this requires

$$m^* = (\tilde{v} + r)/h = (a + x^* + 2r + \sigma/2)/2h, \quad (3.12)$$

if the resulting  $m^* < 1$ .<sup>29</sup>

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members will be excluded from the majority, and this will be the members with the smallest  $v_i$ . Even if  $i$ 's probability of being excluded from the majority is very small, this probability decreases by  $1/h$  if  $x_i$  increases by one marginal unit. However, if the individual shock  $\epsilon_i$  had a bell-formed probability density function, then, as  $m \rightarrow 1$ ,  $\Pr(v_i < v_m)$  is approaching zero, as is the equilibrium investment  $\hat{x}$ . There is then no discontinuity.

<sup>29</sup>If the  $m^*$  defined by (3.12) is such that  $m^* \geq 1$ , implying that there is overinvestment for any  $m < 1$ , the optimal investment level  $x^*$  is not attainable by a pure (non-random) majority rule. The second-best choice is then either the majority rule  $m = 1$ , making  $x = 0$  in equilibrium, or a marginally smaller majority rule which implements the  $\hat{x}$  defined by (3.11) and  $m = 1$ . The latter is the better choice if  $q(\hat{x})\tilde{v}(\hat{x}) - c(\hat{x}) \geq q(0)\tilde{v}(0)$ . If the individual shock  $\epsilon_i$  has a bell-shaped probability density function, however,  $\hat{x}$  approaches zero as  $m$  approaches 1. Then  $m^* \in (0, 1)$  always applies. For this reason, I henceforth assume  $m^*$  to be interior.

If the heterogeneity  $h$  is small, the members' values are closely concentrated. By investing just a little,  $i$  can then increase her probability of becoming a majority member by quite a lot. The individual return to investments is then high. If the enforcement capacity  $r$  increases, the minority is expropriated more and it becomes more attractive to be a majority member sharing these revenues. If there is an increase in the project's value  $a$ , it is possible to tax the minority more and the larger total surplus shared by the majority coalition makes political power more beneficial. Any of these changes make gaining political power more easy or attractive, and the incentives to invest increase. To prevent overinvestments, the majority rule should increase.<sup>30,31</sup>

**Proposition 3:** The optimal majority rule  $m^*$  (3.12) increases in the project's value  $a$  and the club's enforcement capacity  $r$ , but decreases in ex post heterogeneity  $h$ .

This result states that political issues of small average values but large heterogeneities should be taken by small majority rules. The EU's Common Agricultural Policy and its structural funds are characterized by distribution and resemble zero-sum games, while the heterogeneity in preferences typically is large. Such decisions can currently be taken by a qualified majority. International agreements, however, are package deals likely to spread the benefits more evenly, and they are typically (according to economists) of large average value. In line with the theory, such decisions are indeed taken by a larger majority rule in the EU (namely by unanimity). Less important issues (which are likely to have low values) can, as Proposition 3 recommends, be taken by a simple majority (by the Commission). As the EU expands, heterogeneity is likely to increase and the optimal majority rule should decrease. This fits the recent history as well as the Convention's current proposal.<sup>32,33</sup>

## 4. Extensions

Since the model in the previous section is both general and simple, it is a useful starting point for studying other issues. This section employs the model to analyze strategic delegation, externalities, alternative legislative games, and heterogeneity in size and initial conditions. All the various extensions start from the model in Section 2, and they can

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<sup>30</sup>By (3.12),  $m^*$  increases in  $x^*$ . Since  $x^*$  is increasing in  $a$ , the positive effect of  $a$  on  $m^*$  is reinforced. The variance in the aggregate shock,  $\sigma$ , has an ambiguous effect on  $m^*$ . On the one hand,  $\sigma$  increases  $\tilde{v}$  given  $x$ , thus increasing  $m^*$ . On the other hand,  $q$  decreases in  $\sigma$  if  $a + x > 0$ , which in turn decreases  $x^*$  and thus  $m^*$ . If  $\sigma$  is large, the first effect dominates, and if  $a$  is small, both effects are positive. If  $c(x) = kx^2/2$ ,  $\partial m^*/\partial \sigma > 0$  if and only if  $(k\sigma - 1)^2 > (ka + 1)$ .

<sup>31</sup>The positive effect of  $a$  and the negative effect of  $h$  on  $m^*$  are in contrast to Proposition 1 in Aghion, Alesina and Trebbi (2004).

<sup>32</sup>If the EU's enforcement capacity  $r$  increases over time, however, the optimal majority rule should increase, according to Proposition 3. If there were a finite number  $n$  of members, then the hold-up problem would not be complete, since a member would expect to receive  $1/n$  of the return of her investments. As  $n$  grows, the hold-up problem increases, and investments fall. Then, the optimal majority rule decreases. Also this fits well to recent history.

<sup>33</sup>See Hix (2004) for the current rules. The rules proposed by the European Convention can be found at <http://european-convention.eu.int>.

be read independently from each other. However, the extensions can be combined in a straightforward way, and I do discuss their intersections when they are superadditive.

#### 4.1. Strategic Delegation

A central feature of politics is that it is not the agents themselves that are negotiating and voting; it is their representatives. In such contexts, already Schelling (1956) recognized that a member may want to appoint a reluctant delegate in order to increase her bargaining power. Since this delegate is less in favor of the project, the member is taxed less and compensated more notwithstanding if she is in the minority or the majority. On the other hand, Chari, Jones and Marimon (1997, p. 959) claim that members *attempt to increase the probability that their district is included in the winning coalition by choosing a representative who values public spending more*. This subsection argues that these opposing forces are balanced appropriately exclusively at the optimal majority rule.

Suppose that it is possible for  $i$  on day 1 to delegate bargaining authority to some delegate  $d_i$  with a  $d_i$  higher (or lower, if  $d_i$  is negative) value of the project:<sup>34</sup>

$$v_{d_i} = v_i + d_i, \quad (4.1)$$

but there might be some convex cost  $c_d(d_i)$  associated with strategic delegation (e.g. due to distortions).<sup>35</sup> If delegation is sincere, however,  $c_d(0) = 0$  and  $c'_d(0) = 0$ .

If  $d$  denotes the average strategic delegation, the majority coalition shares the total surplus (including what is expropriated by the minority) which is  $\theta + x + d + (1 - m)r$  if the project is implemented, and  $(1 - m)r$  otherwise. The coalition will thus propose to execute the project if and only if

$$\theta + x + d \geq 0, \quad (4.2)$$

which differs from the social optimality condition (3.1) if  $d \neq 0$ . If  $d > 0$ , the delegates are too positive to the project and too many projects will be implemented. If instead  $d < 0$ , the delegates are too negative and too few projects will be implemented. Thus, the optimality condition for delegation is

$$c'_d(d_i^*) = 0 \Leftrightarrow d_i^* = 0. \quad (4.3)$$

But in equilibrium, all members will delegate similarly by  $d$ . Suppose (4.2) turns out to be fulfilled ( $\theta$  large). The delegates' utilities become

$$u_{d_i} = \left\{ \begin{array}{ll} u_N \equiv -r & \text{if } d_i \in N \\ u_M \equiv \frac{\theta + x + d + r(1 - m)}{m} & \text{if } d_i \in M \end{array} \right\}.$$

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<sup>34</sup>It is important that  $i$  delegates before her shock  $\epsilon_i$  is realized. Then,  $i$ 's choice of  $d_i$  does not dictate  $i$ 's (or  $d_i$ 's) future political power, since this will also depend on the noise  $\epsilon_i$ . Thus,  $\epsilon_i$  can be interpreted as some uncertainty about the delegate's preferences (or attractiveness as coalition partner), which will be revealed only after delegation is made. If  $i$  can easily and quickly hire or fire her delegate, it might be more reasonable to allow  $i$  to instead delegate after  $\epsilon_i$  has been realized. This might, however, undermine the value of delegating in the first place, since  $i$  can then easily replace a delegate which is on the way of accepting or rejecting proposals counter to the preferences of  $i$ . Delegation is then not credible (see Katz, 1991, for more on this). Nevertheless, this timing is discussed in Section 4.5, where I do allow for heterogeneity already at the investment stage.

<sup>35</sup>Alternatively,  $d_i$  might be restricted to an interval,  $d_i \in [-D, D]$ . This would provide similar results.

Delegate  $d_i$ 's principal,  $i$  herself, receives the utility  $u_{d_i} - d_i$ . The lower is  $d_i$ ,  $i \in N$ , the more tempted is  $i$ 's delegate to reject the project and the less the majority dares to tax  $i$ . The lower is  $d_i$ ,  $i \in M$ , the less eager is  $i$ 's delegate to implement the project and the more of the total surplus is she able to obtain. Delegating by reducing  $d_i$  is therefore useful for increasing  $i$ 's bargaining power.

If  $\theta < -x - d$ , the initiator anticipates that the project will not be implemented, and the majority coalition will be randomly drawn. If  $\theta \geq -x - d$ , the initiator prefers to form a majority coalition with those  $m$  delegates most in favor of the project, for the same reason as before. The probability of  $i$ 's delegate becoming a coalition member is then

$$p(x_i, d_i) = m + \frac{1}{h} [(x_i + d_i) - (x + d)].$$

Delegating by *increasing*  $d_i$  is therefore useful for increasing  $i$ 's political power.

Anticipating the effects on bargaining power and political power,  $i$ 's problem becomes

$$\text{Max}_{x_i, d_i} \int_{-x-d}^{a+\frac{\sigma}{2}} [p(x_i, d_i)(u_M - d_i) + (1 - p(x_i, d_i))(u_N - d_i)] \frac{d\theta}{\sigma} - c(x_i) - c_d(d_i)$$

which gives the first-order conditions<sup>36</sup>

$$c'(\hat{x}_i) = \left( \frac{\tilde{v}_d + r}{hm} \right) q \quad (4.4)$$

$$c'_d(\hat{d}_i) = \left( \frac{\tilde{v}_d + r}{hm} \right) q - q \quad (4.5)$$

where

$$q = \int_{-x-d}^{a+\frac{\sigma}{2}} \frac{d\theta}{\sigma}$$

is the probability of the project being accepted and

$$\tilde{v}_d = x + d + E[\theta | \theta \geq -x - d] = (a + x + d + \sigma/2) / 2$$

is the delegates' average value of an accepted project.

Comparing (4.4) and (4.5) to the optimality conditions (3.2) and (4.3) shows that the optimal majority rule  $m^*$  is defined as before by (3.12), and that this ensures sincere delegation in addition to optimal investments.

**Proposition 4:** For  $m > m^*$ , members delegate to someone less in favor of the project ( $d < 0$ ) and too few projects will be executed. For  $m < m^*$ , members delegate to someone more in favor of the project ( $d > 0$ ) and too many projects will be executed. Members delegate sincerely ( $d = 0$ ) only at the optimal majority rule  $m^*$  in (3.12).

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<sup>36</sup>The second-order conditions are trivially fulfilled. For simplicity, an interior solution is assumed and the equilibrium (where  $x_i = x$  and  $d_i = d$ ) is assumed to be stable. The determinants of  $\hat{x}_i$  and  $\hat{d}_i$  then determine the equilibrium  $\hat{x}$  and  $\hat{d}$ . See the footnotes in Section 3.2 for further remarks on this.

Though the result above is remarkably comforting, its intuition can easily be explained. Notwithstanding if a member considers to delegate or invest, her action has three possible effects. First, it may directly affect  $i$ 's utility through  $v_i$ , abstracting from any transfers. Second, a higher  $v_{d_i}$  reduces  $i$ 's bargaining power, given her political power. Third, a higher  $v_{d_i}$  makes  $i$  a more attractive coalition partner and  $i$ 's chances of gaining political power increases. While bargaining power and political power determine the distribution of surplus, only the first direct effect is of social value. To make the sum of the three effects equal to the first, the positive effect of  $v_{d_i}$  on expected political power should nullify the negative effect of  $v_{d_i}$  on bargaining power. This condition does not depend on how  $v_{d_i}$  is influenced. Thus, the majority rule  $m^*$  also ensures optimal incentives to make strategic investments or adjustments to the status quo. This further implies that it does not matter how the status quo is defined (whether or not the project should be undertaken); the appropriate majority rule ensures optimal incentives in any case.<sup>37</sup>

In the European Union, different majority rules are used by the Council, the Commission, and the Parliament. While the last two apply simple majority rules, the Council typically requires qualified majorities or unanimity. Proposition 4 predicts that the representatives in the Council should be more protectionistic (status-quo biased) than the Commission and the Parliament. This seems to be the case indeed.<sup>38</sup>

Another interpretation of  $d$  is interesting to consider. So far, the analysis relies on complete and symmetric information. It may be argued, however, that  $i$  is likely to have a better estimate of  $v_i$  than has any of her opponents  $j \neq i$ . Note, first, that the argument above works in any case, as long as  $v_{d_i}$  is observable. Thus,  $m^*$  is the only majority rule which gives the members incentives to reveal their types truthfully by sincere delegation. Second, abstracting from delegation,  $(d_i + x_i + \theta)$  may be interpreted as  $i$ 's "announcement" of her expected value  $x_i + \theta$  on day 1. The announcements may influence the members' bargaining power and political power, which is also affected by some noise  $\epsilon_i$ . Though I do not provide a bargaining model of asymmetric information, the results above suggest while announcing a lower value increases  $i$ 's bargaining power, it reduces her chance to get political power. The two opposing forces may be balanced by the optimal majority rule.

## 4.2. Externalities

So far in the analysis, one member's investment has effect on her own value only. More generally, however, one member's value of the project might depend on another member's action. For example, if country  $i$  modernizes and succeeds in creating a more competitive sector, it may affect the neighboring country  $j$ 's value  $v_j$  of liberalization. If  $j$  expects to import services from  $i$ ,  $j$ 's value  $v_j$  of trade liberalization might increase when  $i$  becomes more efficient. If instead  $j$  fears tough competition from  $i$ ,  $j$ 's value  $v_j$  of liberalization

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<sup>37</sup>A previous version of this paper allowed members to invest by  $y_i$  in the status quo. This is valuable if the project turns out to be bad. If the project turns out to be good, a larger investment in the status quo gives  $i$  more bargaining power but less political power. Member  $i$ 's first-order condition  $q - (\tilde{v} + r)q/hm$  coincides with the first-best condition  $q - 1$  if and only if  $m = m^*$ . If  $m > (<)m^*$ , members invest too much (little) in the status quo.

<sup>38</sup>Also for environmental policies, Weale (2002, p. 210) observes that *the Parliament has the general reputation of having a policy position that is more pro-environmental than the Council of Ministers*.

might be reduced. To capture such effects, let individual values be determined by

$$v_i = \theta + (1 - e)x_i + ex + \epsilon_i,$$

where  $e$  reflects a positive (negative) externality of private investment if  $e > (<)0$ . The coefficients are normalized such that the social value of investments is the same as previously, and the optimal level of investment is still defined by (3.2).

Private investments are only undertaken to the extent that they affect private values. It is easily shown that member  $i$ 's optimal investment level, corresponding to (3.8), is modified to

$$c'(\hat{x}_i) = (1 - e)q \left( \frac{\tilde{v} + r}{hm} \right), \quad (4.6)$$

where  $q$  and  $\tilde{v}$  are as defined in Section 3.2. If  $e$  is positive, then  $i$  only captures a fraction  $(1 - e)$  of the total direct effect of  $i$ 's investment. The danger is underinvestment. To motivate sufficient investments, the prospects of political power must become more attractive. This can be done by reducing the majority rule, since this decreases the number of losers that must be compensated and the surplus for each majority member increases. If the externality is negative, members are instead likely to overinvest. A larger majority rule is then required to discourage investments. In either case, the first-best investment level can be achieved by selecting the majority rule inducing  $\hat{x}_i = x = x^*$  in (3.2):

$$m_e^* = (1 - e)(\tilde{v} + r)/h = (1 - e)(a + x^* + 2r + \sigma/2)/2h. \quad (4.7)$$

**Proposition 5:** The optimal majority rule  $m_e^*$  decreases in the externality  $e$ , and it induces members to internalize the externality.

This result suggests that political issues, characterized by positive externalities of countries' investments, should be decided by a smaller majority rule. It is interesting to note that the common market in the EU was the first area where qualified majority voting was applied in the EU. According to the Single European Act, e.g. environmental issues can be decided by a qualified majority according to Article 100a, or by unanimity according to Article 130s. The latter applies to environmental issues in general, while the first applies to issues related to the common market. Then, environmental policy is likely to have spillover effects through trade in addition to cross-border pollution.

### Delegation and Externalities

To repeat,  $i$ 's choice of effort has three effects on  $i$ : the direct effect on  $v_i$ , the effect on  $i$ 's bargaining power and the prospects for political power. While only the first effect is of social value, it does not reflect the full social value of the investment when there are externalities. Making the sum of the effects on political power and bargaining power zero is not sufficient to ensure optimality, instead, this sum should be set equal to the externality that we want to internalize. But when the effects on bargaining power and political power do not cancel, Proposition 4 implies that members delegate strategically. By comparing (4.6) and (4.5), we realize that no majority rule can make them both coincide with the optimality conditions (3.2) and (4.3).

**Proposition 6:** If there are externalities, no majority rule can ensure both optimal investments and sincere delegation.

To guarantee optimal investments,  $m$  should be reduced (increased) to internalize a positive (negative) externality. This, however, will induce members to delegate strategically to someone more (less) in favor of the project in order to increase their prospects for political power (bargaining power). To ensure sincere delegation,  $m$  should be set equal to  $m^*$ , independent of any externalities. But then, no externalities will be internalized. The optimal majority rule will have to be a compromise, depending on what is most important: investments or sincere delegation.<sup>39</sup>

### 4.3. Legislative Extensions

The legislative game, as described in Section 2, is both simple and specific. Informed readers might have noticed several discrepancies relative to the European Union, for example. This section generalizes the legislative game in three ways, all of which better tie the model to European institutions in particular, and most political systems in general. While the previous results survive, new insights emerge.

The European Union consists of several chambers, not only the Council as assumed above. Indeed, most proposals are negotiated in the European Commission before they are submitted to the Council which, in turn, has small possibilities of making amendments.<sup>40</sup> Also the European Commission consists of national representatives. The majority rule  $\underline{m}$  applied by the Commission is typically smaller ( $\underline{m} = 1/2$ ) than the majority rule  $m$  applied by the Council. To reflect this legislative design, suppose the initiator in the Commission first selects a minimum-winning coalition  $\underline{M} \subset I$  of mass  $\underline{m}$  (relative to the Commission's size) which negotiates a proposal. All members of  $\underline{M}$  must agree before the proposal is submitted as a take-it-or-leave-it offer to the Council. The proposal is implemented if a fraction  $m$  in the Council approves the proposal, while everyone accepts ( $u_i \geq -r \forall i$ ). This generalization fits most bicameral political systems, but it can also be interpreted differently: Even with one chamber, the initiator might want to select a coalition of size  $\underline{m} \neq m$ , different than the majority rule. Thus, this extension may be interpreted as a relaxation of Riker's (1962) minimum-winning-coalition assumption.

Second, the initiator, as a president, might have excessive bargaining power. Instead of assuming, as above, that all coalition-members have equal bargaining power, it is likely that the president can suggest the first proposal. Only if this offer is rejected will a randomly drawn coalition-member make another proposal. If there is a discount factor  $\delta$  between successive offers, then the initiator is able to capture a share  $(1 - \delta)$  of the total surplus. The other members of  $\underline{M}$  receive equal shares of the remaining fraction  $\delta$ . More power to the president is reflected by a smaller  $\delta$ .<sup>41</sup>

<sup>39</sup>It is interesting to notice that when the  $v_i$ s are private information, there does not exist *any* mechanism that can solve this trade-off in a better way. Some majority rule can always replicate the mechanism.

<sup>40</sup>The EU is tricameral including the Parliament. At the present rules, however, the Parliament is of less importance, and investigating it is thus relegated for future research.

<sup>41</sup>Kirchner (1992, p. 80) discusses the President's role in the EU. He finds that *there is a great deal of collaboration between the Presidency and the Commission in the setting of the six-monthly priorities.*

Third, the Convention suggests rotating representation in the European Commission. There are supposed to be 15 commissioners with a vote and 15 without. Countries will take it in turns, in strict rotation, to have one of the proper jobs. Suppose that member  $i$  is represented in the Commission with probability  $l_i$  only. With probability  $1 - l_i$ ,  $i$  has no representative in the Commission, and  $i \notin \underline{M}$  notwithstanding  $v_i$ . With these generalizations, the model can be solved by backward induction as above.

While member  $i \in \underline{M}$  have political power as previously, member  $j \in I \setminus \underline{M}$  just responds to the take-it-or-leave-it offer made by  $\underline{M}$ . To implement the policy as cheaply as possible,  $\underline{M}$  expropriates the minority of mass  $1 - m$  by giving them the reservation utility of  $-r$ . In any case, their approvals are superfluous. All other members receive a utility of exactly zero - just sufficient to make them approve the project. If the project is to be implemented, any initiator prefers as coalition partners (to  $\underline{M}$ ) those  $\underline{m}$  members (represented in the Commission) most in favor of the project. To reduce the amount of compensation, the minority not compensated to approve the project will be the  $1 - m$  members least in favor of the project. The argument for this coalition formation is similar to that in section 3.1.<sup>42</sup> When transaction costs are negligible,  $\underline{M}$  prefers to implement the project if and only if it increases total welfare. Proposition 1 survives.

Assume, for a moment, that all members invest the same amount  $x$ , such that their values of the project become uniformly distributed with mean  $\theta + x$  and density  $1/h$ . Anticipating this,  $i$  expects the probability of  $i \in \underline{M}$  to be

$$\underline{p}(x_i) = l_i \left[ \underline{m} + \frac{1}{h} (x_i - x) \right],$$

while the probability that  $i$  becomes a minority member is  $1 - p(x_i)$  as before (3.6). If  $\theta \geq -x$ , the project is implemented and  $i$ 's payoff becomes

$$u_i = \left\{ \begin{array}{ll} u_N = -r & \text{with probability } 1 - p(x_i) \\ u_M = 0 & \text{with probability } p(x_i) - \underline{p}(x_i) \\ u_{\underline{M}} = \delta [\theta + x + r(1 - m)] / \underline{m}l & \text{with probability } \underline{p}(x_i) \end{array} \right\},$$

since the mass of  $\underline{M}$  is  $\underline{m}l$  if  $l$  is the average  $l_i$ . At the investment stage,  $i$ 's problem becomes

$$\underset{x_i}{Max} \int_{-x}^{a+\sigma/2} [p(x_i)u_M + (1 - p(x_i))u_N] \frac{d\theta}{\sigma} - c(x_i)$$

with the first-order condition

$$c'(\hat{x}_i) = \frac{q}{h} \left[ \frac{l_i}{l} \frac{\delta}{\underline{m}} (\tilde{v} + r(1 - m)) + r \right],$$

where  $q$  and  $\tilde{v}$  are as defined in Section 3.2. Thus, Proposition 2 continues to hold, but there are three new effects. First,  $i$ 's investment decreases in both  $\underline{m}$  and  $m$ , since both kinds of majorities require that losers are compensated instead of being expropriated by the majority. Second,  $i$  invests less if the president is powerful ( $\delta$  small), since this reduces

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<sup>42</sup>Formally, the argument justifying this coalition formation requires some marginal transaction costs.



the benefit of becoming a majority member. Third,  $i$  invests less if  $l_i$  is low relative to  $l$ . If  $l_i$  is small, her representation in the Commission is quite unlikely, and  $v_i$  is less likely to influence  $i$ 's political power. This can be compensated by a smaller  $l$ , however, since then, the total surplus is shared among a small mass of Commission members  $\underline{m}l$ . Investments are optimal if  $\hat{x}_i = x^*$  (defined as previously by (3.2)) requiring that

$$\frac{mr}{h} + \frac{\underline{m}l}{\delta l_i} \left(1 - \frac{r}{h}\right) = \frac{\tilde{v} + r}{h}. \quad (4.8)$$

The solution for  $m$  is interior only if the parenthesis is positive, which I thus assume. While Proposition 3 continues to hold, (4.8) shows that the two majority rules  $m$  and  $\underline{m}$  are substitutes. Incentives remain optimal even if  $\underline{m}$  increases, provided that  $m$  decreases accordingly. To encourage sufficient investments,  $m$  should decrease if the president becomes more powerful ( $\delta$  decreases). This is, indeed, the combination proposed by the Convention.<sup>43</sup>

**Proposition 7:** Member  $i$ 's investment decreases in the majority rules  $m$  and  $\underline{m}$ , the president's power  $(1 - \delta)$ , the size of the commission  $l$ , but increases in her own probability of being represented  $l_i$ . Thus, the optimal majority rule  $m$  ( $\underline{m}$ ) decreases in  $\delta$  and  $\underline{m}$  ( $m$ ), and rotating representation is of no importance if  $l_i = l\forall i$ .

#### 4.4. Heterogeneity in Size

Heterogeneity in size is easily motivated. In the European Union, constitutional debates quite often separate large (e.g. Germany and France) from small (e.g. Belgium and Denmark) nations. In corporate governance, some shareholders own more shares than others. While the size of a small member is normalized to one, suppose a fraction  $k$  of all members to be of size  $z > 1$ . To simplify, assume that the following per capita measures are independent on size: the value of the project, reservation utility, and cost of investment. Thus, if the project is implemented, the total utility of a large member is  $u_i^z = zv_i - t_i$ , such that per capita utility is  $v_i - t_i/z$ . If a member is in minority, the per capita utility is  $-r$ , and a large minority member is taxed by  $t_i = z(v_i + r)$ . That the reservation utility is the same per capita indicates that the per capita benefit from continuing cooperation is the same for all, or that a member failing to implement an approved project faces a fine proportional to its size.

Whatever is the majority coalition, the majority expropriates the minority and shares the surplus equally, just as before. But whom will the initiator select as majority members? In the majority coalition, a large member negotiates with one voice, just as the others, and ends up with the same utility  $u_M$ .<sup>44</sup> This implies that  $t_i = zv_i - u_M$ . Thus, the cost of inviting a large member to the coalition, instead of expropriating it as a minority

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<sup>43</sup>An earlier version of this paper discussed the stability of coalitions. If coalitions were quite stable, in the sense that they are formed independently of the particular project, then investments are less likely to affect political power. Members invest less, and the majority rule should be smaller. This characterizes most national parliaments.

<sup>44</sup>Thus, a large country has a lower per capita bargaining power. This reflects the well-known feature, observed by e.g. Wallace (1989, p. 202), *that small parties often do disproportionately well out of coalition bargaining*.

member, is  $u_M + zr$ . The cost of inviting a small member, by contrast, is only  $u_M + r$ . Hence, with equal voting weights, small members will be preferred as coalition partners. If  $m < 1 - k$ , the initiator does not need to include any large members in her coalition, and large members lack incentives to invest as they cannot gain political power in any case.

Suppose, instead, that larger members have proportionally more voting power (using the one-share-one-vote principle). The alternative to inviting one large member is then to invite  $z$  small members, which costs  $z(u_M + r)$ . Then, large members are preferred as coalition partners. If  $m < k$ , small members do not invest as they cannot gain political power in any case.

To give all members incentives to invest, the initiator must be indifferent between inviting a small and a large member that both have a high value of the project. Suppose the voting power of a large member to be  $w$ . For two members with the same value of the project, the initiator is indifferent to their size if  $u_M + zr = w(u_M + r)$ , i.e.,  $w$  should be a weighted average of the principle one-member-one-vote, and the alternative proportionality (or one-share-one-vote) principle:

$$w = z \left( \frac{r}{u_M + r} \right) + \left( \frac{u_M}{u_M + r} \right). \quad (4.9)$$

Only under such weights do all members have incentives to invest. If the enforcement capacity  $r$  increases, or  $u_M$  decreases (since e.g. the remaining projects become less valuable), the weights should be more proportional to size.

Another solution is to use both principles, and require that a political proposal must fulfill two criteria: First, it must be approved by a fraction  $m$  ( $= 1/2$ ) of all members. If  $\pi_1$  and  $\pi_z$  denote the mass of small and large members that approve the project, respectively, this condition can be written as:

$$\pi_1 + \pi_z \geq m \quad (4.10)$$

Second, the set of members that approve the project must contain a required mass (or population):

$$\pi_1 + z\pi_z \geq m_P. \quad (4.11)$$

As noted above, to fulfill (4.10), the initiator prefers to select small members as coalition members. To fulfill (4.11), instead, large members are preferred. To give both large and small members incentives to invest, both (4.10) and (4.11) must bind in equilibrium.<sup>45</sup> This requires:<sup>46</sup>

$$m < m_P < mz. \quad (4.12)$$

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<sup>45</sup>If both (4.10) and (4.11) hold with equality,

$$\begin{aligned} \pi_1 &= \frac{mz - m_P}{z - 1} \\ \pi_z &= \frac{m_P - m}{z - 1}. \end{aligned}$$

<sup>46</sup>To see this, just apply the previous footnote and require  $\pi_1, \pi_z > 0$ .

Moreover, for small and large members to face the *same* chance of becoming majority members, it is required that  $m_P = m(1 - k + kz)$ , where  $(1 - k + kz)$  is the total population.<sup>47</sup>

To summarize, to give both small and large members *some* incentives to invest, it is sufficient with regressive voting weights (4.9) or double majority rules for both the number of members and the mass they contain (4.12). But does this ensure that the incentives are the *same* for small and large members? As before, small members invest until  $c'(x_i) = q(u_M + r)/h$ . Large members invest less, however, since they do not have proportionally larger bargaining power over the total surplus.<sup>48</sup> The problem of large members is:

$$\begin{aligned} \text{Max}_{x_i} \int_{-x}^{a+\frac{\sigma}{2}} [p(x_i)u_M - (1 - p(x_i))rz] \frac{d\theta}{\sigma} - zc(x_i) \Rightarrow \\ c'(\hat{x}_i) = \frac{q}{h} \left( \frac{u_M}{z} + r \right). \end{aligned}$$

How can we ensure that both large and small members invest optimally? Suppose we introduce the extensions of the legislative game proposed in the previous section. Let small and large members be politically represented with probabilities  $l_1$  and  $l_z$ , respectively. The investments of small and large members become

$$\begin{aligned} c'(\hat{x}_i) &= \frac{q}{h} \left[ \frac{l_1}{l} \frac{\delta}{m} (\tilde{v} + r(1 - m)) + r \right] \\ c'_z(\hat{x}_i) &= \frac{q}{h} \left[ \frac{l_z}{zl} \frac{\delta}{m} (\tilde{v} + r(1 - m)) + r \right]. \end{aligned}$$

Thus, to ensure the optimal investment level by both large and small members, representation should be proportional to size:<sup>49</sup>

$$l_z/l_1 = z. \quad (4.13)$$

By substituting this equality in the above equations, and by setting these equal to the optimal investment level, the results of Propositions 3 and 7 are confirmed. To summarize the results of this section, instead:

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<sup>47</sup>This can be seen by solving

$$\begin{aligned} \frac{\pi_1}{1 - k} &= \frac{\pi_z}{k} \Rightarrow \\ \frac{mz - m_P}{(z - 1)(1 - k)} &= \frac{m_P - m}{(z - 1)k}. \end{aligned}$$

<sup>48</sup>If the number of members,  $n$ , were finite, then, as noticed in footnote 32, the hold-up problem would not be complete. Moreover, the hold-up problem would affect large members less, since they would be able to influence the total value more, of which they can expect to receive  $1/n$ . Thus, large members may invest more than small members. But as  $n$  grows, this effect vanishes.

<sup>49</sup>Of course, members disagree over such weights in isolation, as recently demonstrated by the failure to agree on a constitution for Europe. With side payments available at the constitutional stage, however, the optimal constitution is likely to be the outcome. Thus, *Financial Times* states on December 15th (p. 4) that *Mr Schröder will now hope German threats of financial retribution will force Spain and Poland to back down when treaty talks finally resume.*

**Proposition 8:** To ensure that both small and large members have incentives to invest, the voting weights (4.9) should be regressive in size, or majority rules for the number of members and their mass should be combined (4.12). In addition, to ensure first-best incentives, the probability of being represented politically (4.13) should increase in size.

The European Union is indeed using regressive voting weights currently,<sup>50,51</sup> while the US is using a double majority system where both the House and the Senate must approve policies. The European Convention suggested to employ the double majority rule system as well, setting  $m = 0.5$  and  $m_P/(1 - k + kz) = 0.6$ , thus favoring large countries. Interestingly, the Irish presidency of the EU recently recommended that  $m = m_P/(1 - k + kz) = 0.55$ . Still, the problem with a double majority rule system is that countries of intermediate size will be least preferred as coalition partners. They will not have incentives to invest and they are worse off. This explains why the medium-sized countries in the EU (Spain and Poland) currently oppose the proposed double majority system.

#### 4.5. Heterogeneity in Preferences

In the simple model, all members were assumed to be identical at the investment stage. This does not characterize Europe very well. Even though countries can alter their competitiveness by domestic investments, some countries are simply more likely to gain from a project than others. This may reflect previous policies, such as the UK's privatization effort under Margaret Thatcher. Alternatively, it reflects differences in natural conditions, as might be the case for Scandinavia's stance in agricultural politics. Thus, already at the investment stage, some countries may be certain of gaining, while others may certainly lose if some project is executed. If these countries cannot influence their political power at the legislative stage, the hold-up problem induces them to prepare too little.

Let individual values now be given by  $v_i = \theta + a_i + x_i + \epsilon_i$ , where the  $a_i$ s are known by everybody at the time when the  $x_i$ s are chosen, and the average  $a_i$  is zero. This modification of the model may be interpreted as an alteration of the timing, where *some* of the individual shock is revealed *before* investments are chosen.<sup>52</sup>

As before, the majority coalition offers the minority their reservation utility only, shares the total surplus equally and implements only good projects. This coalition consists of the  $m$  members most in favor of the project:  $M = \{i \in I | v_i \geq v_m\}$  for some  $v_m$ .<sup>53</sup> If

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<sup>50</sup>In fact, the existing system is much more complex than weighted votes. For a decision to be taken, there are requirements on the approval number of (weighted) votes, the number of countries, and the associated size of the population. For most cases, however, only the first of these will bind (Baldwin and Widgren, 2003).

<sup>51</sup>Barbera and Jackson (2004b) provide another explanation for regressive voting schemes. In their model, a large country is more heterogeneous, and its value  $v_i$  is therefore more concentrated around its expected value. This is of no importance for the optimal weights if there are side payments, however.

<sup>52</sup>If there were externalities, and  $v_i = \theta + (1 - e)x_i + e_ix + \epsilon_i$ , then heterogeneity w.r.t. the  $e_i$ s has the similar effects as heterogeneity w.r.t. the  $a_i$ s, discussed here.

<sup>53</sup> $v_m$  is implicitly defined by the requirement that the mass of agents  $i$  s.t.  $v_i \geq v_m$  must equal  $m$ , i.e.:  $m = \int_{i \in [0,1]} \int_{v_m - a_i - \hat{x}_i}^{h/2} (d\epsilon_i/h) dF(a_i)$  where the  $a_i$ s are distributed with cdf  $F(a_i)$ .

the project turns out to be good,  $i$ 's probability of obtaining political power is

$$p(x_i, a_i) = \left\{ \begin{array}{ll} 0 & \text{if } (a_i + x_i + h/2 - v_m)/h < 0 \\ (a_i + x_i + h/2 - v_m)/h & \text{if } (a_i + x_i + h/2 - v_m)/h \in [0, 1] \\ 1 & \text{if } (a_i + x_i + h/2 - v_m)/h > 1 \end{array} \right\}.$$

As previously,  $i$ 's problem on day 1 is given by

$$Max_{x_i} \int_{-x}^{a + \frac{\sigma}{2}} [p(x_i, a_i)u_M + (1 - p(x_i, a_i))u_N] \frac{d\theta}{\sigma} - c(x_i),$$

where  $u_M$  and  $u_N$  are still given by (3.5). It is straightforward to show that the solution to this problem is

$$\begin{array}{ll} x_i = 0 & \text{if } a_i < a_A \\ c'(x_i) = c'(\hat{x}) \equiv q(\tilde{v} + r)/mh & \text{if } a_i \in [a_A, a_B] \\ x_i = h/2 + v_m - a_i & \text{if } a_i \in (a_B, a_C] \\ x_i = 0 & \text{if } a_i > a_C \end{array}$$

where the critical values  $a_A < a_B < a_C$  are defined by

$$\begin{aligned} a_A &\equiv \frac{hc(\hat{x})}{q(u_M - u_N)} - \hat{x} - \frac{h}{2} + v_m \\ a_B &\equiv \frac{h}{2} + v_m - \hat{x} \\ a_C &\equiv \frac{h}{2} + v_m. \end{aligned}$$

Member  $i$ 's investment is  $\hat{x}$  only if  $i$ 's initial value  $a_i$  is in the intermediate interval  $[a_A, a_B]$ . If  $i$ 's  $a_i$  is lower than  $a_A$ ,  $i$  does not find it worthwhile to invest to have a chance of becoming a majority member at the legislative stage. In any case, this probability will be very small. Having surrendered all chances of political power,  $i$  has no incentives to invest since the majority will, in any case, expropriate her entire surplus. If  $a_i > a_B$ ,  $i$  is certain of becoming a majority member even if  $i$  does not invest as much as  $\hat{x}$ . An investment of  $h/2 + v_m - a_i$  is exactly sufficient to ensure that  $i$  will become a majority member, even if  $i$  should unfortunately be hit by a negative shock  $\epsilon_i$ .  $i$  therefore invests exactly the amount guaranteeing political power: a larger value will just reduce  $i$ 's bargaining power and force  $i$  to compensate other members of the coalition. The larger is  $a_i$ , the less  $i$  needs to invest to guarantee political power. If  $a_i = a_C$ ,  $i$  does not need to invest at all:  $i$  is in any case a certain majority member. For  $a_i \geq a_C$ , therefore,  $i$  does not invest.<sup>54</sup>

Similar results hold for strategic delegation. If  $a_i$  is large (small),  $i$  is certain (not) to gain political power, and  $i$  appoints a delegate less in favor of the project (choosing the  $d_i < 0$  satisfying  $c'_d(d_i) = -q$ ) in order to gain bargaining power.  $i$  appoints a more moderate delegate (by increasing  $d_i$ ) only if this may increase  $i$ 's political power, which

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<sup>54</sup>If the distribution of individual shocks were bell-shaped, the level of investments  $\hat{x}_i$ , as a function of  $a_i$ , would also be bell-shaped.

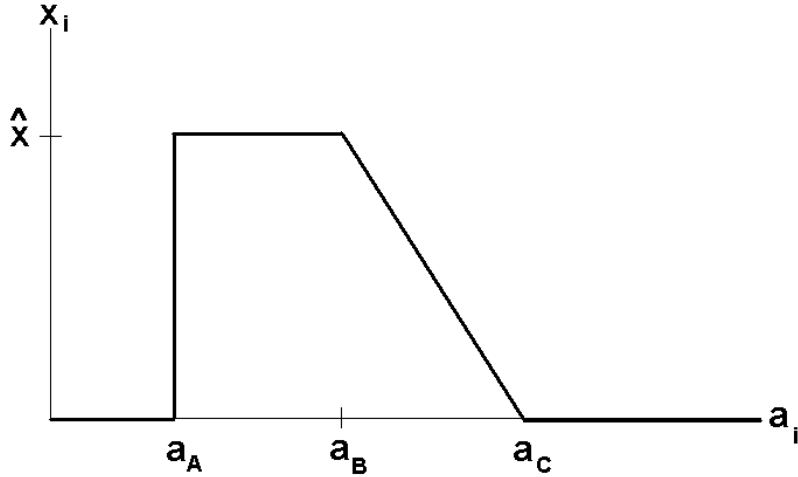


Figure 4.1: Only members with intermediate initial values are motivated to invest by the prospects for political power.

is possible only if  $a_i$  is in the intermediate range. The equilibrium levels of  $d_i$  resemble Figure 4.1.

Can this situation be improved? I will now show that these problems can, in principle, be solved using the same instruments as if the members were of different size. The problem above is that members with large (small)  $a_i$ s are too (un)attractive as coalition partners. But as we learned in the previous section: attractiveness can be modified by voting power. Suppose member  $i$ , with the initial value  $a_i$ , has voting power  $w_i$  in the future vote upon this project. To give all members that have invested the same  $x_i$  a fair chance of becoming coalition members, they must all be equally attractive as coalition partners. To the initiator, this requires that the cost of inviting another coalition member, relative to the weight of her vote, should be independent of  $a_i$ . Introducing the same transaction costs as in Section 3.1, the per capita surplus in the majority is, from (3.3):

$$\frac{\int_M v_j dj + \int_N (v_j + r)(1 - \lambda) dj}{\int_M dj},$$

and, it can be shown, the initiator selects the members with the highest  $x_i + \epsilon_i$  (instead of those with the highest  $v_i$ ) as coalition partners if

$$w_i = (\gamma - \lambda a_i) \kappa, \quad (4.14)$$

where  $\kappa$  can be any positive constant and where

$$\gamma \equiv \frac{\tilde{v}(1 - \lambda) - \int_N a_j \lambda + r(1 - \lambda) dj}{\int_M dj}.$$

Thus, to give all members a fair chance to earn political power (and be motivated thereof), members that are (un)likely to be in favor of the project should have accordingly low

(large) voting power. If the transaction cost  $\lambda$  is small, the required difference in voting weights (4.14) is also small.<sup>55</sup>

There are, as in the previous section, alternatives to adjusting the weights of votes. Suppose there are a large number of members with initial condition  $a_i$ . If the political proposal required, by the constitution, approval from some members with all kinds of initial conditions  $a_i$ , the initiator would prefer to collude with those that have performed best relative to their initial condition. Then, all members are motivated to invest. A similar solution is to introduce two chambers, as in Section 4.3. Even if a member with large initial value  $a_i$  is certain of being included in the broader majority  $m$  in the Council,  $i$  might still invest to be included in the more exclusive majority  $\underline{m}$  (of size  $\underline{m} < m$ ) in the Commission. Even if a member with small  $a_i$  is certain of being excluded from the majority  $\underline{m}$  in the Commission,  $i$  might still invest to be included in the majority of size  $m > \underline{m}$  in the Council.<sup>56</sup>

**Proposition 9:** With heterogeneity in initial values  $a_i$ , extreme members ( $a_i < a_A$  or  $a_i > a_C$ ) do not invest. To motivate all members to invest optimally, it is necessary to allocate more voting power (4.14) to members with low initial value of the project, or to require that the majority coalition is supported by members with different initial conditions.

## 5. Majority Rules and Side Payments

Crucial in the analysis above is the assumption that members may use side transfers to compensate and expropriate. As argued in the Introduction, such side payments can be facilitated by issue linkages or redefining the project, and they are likely to appear in contexts such as the EU. In other contexts, however, members might not be able to use side payments. So what about majority rules and incentives? This section solves the game above, all extensions included, for the case without side payments. The outcome is contrasted to the results above. This comparison is useful both to understand the limits of the results and shed light on controversies in the literature.

The model is almost the same as in Sections 2-4: only the legislative game is different. Now, each policy proposal can only specify whether the project is to be implemented; all transfers are bound to be zero. If the initiator happens to lose from the project, she prefers a coalition of other losers to ensure the project is not proposed and the vote will never take place. Assume, however, that at least one alternative can be suggested by the other members (citizen initiative). Then, some winner of the project proposes to implement it, and the final vote will be decisive.

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<sup>55</sup>Though members disagree over such weights in isolation, they should all agree on the optimal solution at the constitutional stage if side payments are available.

<sup>56</sup>Another solution, discussed in the final section, is to make all members uncertain about their future political power, by delaying the vote further into the future. The range of  $a_i$ s where  $x_i = \hat{x}$  is  $a_B - a_A = h[1 - c(\hat{x})/q(u_M - u_N)]$ , which is increasing in the variance of  $\epsilon_i$ ,  $h$ . For a sufficiently large  $h$ , all members are uncertain whether they will get political power, all have initial values  $a_i \in [a_A, a_B]$  and all will invest  $\hat{x}$ . With Brownian motions (of the  $\epsilon_i$ s), the heterogeneity  $h$  at the legislative stage increases in the time to that stage (the  $\epsilon_i$ s would of course not be uniformly distributed).

As before, projects should be undertaken if and only if  $\theta \geq -x$ , and optimal investments and delegation are given by (3.2) and (4.3). Whether the project actually will be approved depends on whether the number of winners is larger than the required majority. Suppose the values  $(v_{d_i} - \theta)$  happen to be distributed according to the cdf  $G(v_{d_i} - \theta)$ , and that the shock  $\epsilon_i$  is uncorrelated to  $i$ 's size.<sup>57</sup> Assume  $v_i > -r\forall i$ . The project is executed if

$$\begin{aligned} 1 - G(-\theta) &\geq m \Rightarrow \\ \theta &\geq \hat{\theta} \equiv -G^{-1}(1 - m). \end{aligned} \quad (5.1)$$

Thus, the selection of projects depends on the majority rule. The larger is  $m$ , the larger is  $\hat{\theta}$ , and the fewer projects are executed. If members were identical ( $a_i = 0\forall i$ ), they would invest the same amount and the values  $v_{d_i}$  would be uniformly distributed with mean  $\theta + x - d$  and density  $1/h$ . The project would be implemented if the mass of winners is larger than  $m$ . (5.1) becomes

$$\theta \geq \hat{\theta} \equiv -x - d + h(m - 1/2). \quad (5.2)$$

Anticipating that  $d = 0$ , and comparing with the above optimality condition (3.1), we notice that the selection of projects is optimal if and only if  $m = 1/2$ . That the optimal majority rule is exactly  $1/2$  follows from the symmetric distribution of preferences, and it resembles May's (1952) Theorem.

If the project is executed, an individual's utility becomes

$$u_i = (1 - e)x_i + ex + \theta + a_i + \epsilon_i.$$

Thus, at the stage of investment, a large country's problem is

$$\text{Max}_{x_i, d_i} \int_{\hat{\theta}}^{a + \frac{\sigma}{2}} zu_i \frac{d\theta}{\sigma} - zc(x_i) - zc_d(d_i),$$

while a small country's problem is obtained by setting  $z = 1$ . Independent of size, the first-order conditions become<sup>58</sup>

$$c'(x_i^n) = (1 - e)q \quad (5.3)$$

$$c'_d(d_i^n) = 0 \quad (5.4)$$

where

$$q = \int_{\hat{\theta}}^{a + \frac{\sigma}{2}} \frac{d\theta}{\sigma}$$

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<sup>57</sup>Voting weights w.r.t. size is then unimportant, since both small and large countries will have the same distribution of values (if they make the same investments). If  $\epsilon_i$  is correlated with size, or the number of members  $n$  is finite, weights should be proportional to size.

<sup>58</sup>The second-order conditions are trivially fulfilled.



is the probability of the project being implemented.

If there are no externalities, i.e.  $e = 0$ , then (5.3) and (5.4) coincide with the first-best conditions (3.2) and (4.3) given  $q$ . Incentives are optimal and delegation sincere, whatever is the majority rule, the legislative game  $(\underline{m}, \delta, l_i)$ , the size and the initial condition  $a_i$ . These results should not come as a surprise: without transfers, only the first, direct, effect of the investments affects  $i$ 's utility. Bargaining power cannot be exploited and political power has no return. Investments are then optimal and delegation sincere. Externalities, however, cannot be internalized in this framework.

**Proposition 10:** Suppose there are no side payments. The selection of projects depends on the majority rule, but delegation is sincere and incentives are optimal unless there are externalities. Heterogeneity in size or preferences, or certain aspects of the political system  $(\underline{m}, \delta, l_i)$ , have no impact.

The result explains the strong emphasis on the selection of projects by the earlier literature: e.g. Wicksell (1896), Buchanan and Tullock (1962) and Aghion and Bolton (2003). As shown by the latter contribution (as well as Section 3.1 in this paper), the selection depends on the majority rule also if side payments exist, as long as there are transaction costs. Then, the optimal majority rule is likely to depend on the form and size of these transaction costs, and Mueller (1989, p. 105) suggests that this explains controversies in the literature. The contrast to the present paper, however, is not only due to the vanishing transaction costs; most of all, it arises because project-values are endogenous. By comparing Propositions 1-9 to Proposition 10, the effect of side payments is isolated. The good news is that the selection of projects is always efficient - whatever the majority rule (unless there is strategic delegation). The Coase Theorem extends since the winners can simply compensate the losers. The bad news is that the incentives (and delegation) may not be optimal - this hinges on the particular majority rule. The side payments increase investments if the majority is small, while they reduce investments if the majority is large.<sup>59</sup> Instead of ensuring the right selection of projects, the majority rule should be set such that incentives are optimal. Then, even externalities can be internalized. However, the majority rule should also reflect other aspects of the political system, such as the president's power and bicameralism. Moreover, heterogeneity in size or initial conditions distort incentives, unless votes are appropriately weighted or double majorities required.

## 6. Research Ahead

### 6.1. A Quick Summary

Motivated by the seminal debate over Europe's future constitution, this paper takes a new look on how to take collective decisions in general, and how to choose majority rules in particular. While the earlier literature emphasizes the importance of selecting the

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<sup>59</sup>Similarly, the incentive to claim a low value of the project increases when side payments are possible (under unanimity). As this can lead to costly signaling, I elsewhere (Harstad, 2003) derive conditions under which side payments are detrimental to total welfare.

right projects, I show that the selection is always efficient if side payments are possible. While the earlier literature takes the individual values of the project as exogenous, I study the incentives to influence these values. If the majority rule is large, members underinvest due to a hold-up problem. If the majority rule is small, members overinvest to gain political power. To balance these incentives, the majority rule should increase in the club's enforcement capacity and the project's expected value, but decrease in the ex post heterogeneity in preferences. Not only does this optimal majority rule ensure first-best investments; it also ensure sincere delegation. Positive (negative) externalities related to the investment can be internalized by a smaller (larger) majority rule, but members may then delegate strategically. Different majority rules in bicameral systems are substitutes, and they should decrease in the president's power. Heterogeneity with respect to preferences or size should be acknowledged by appropriately weighting the votes, and smaller members should be represented politically less frequently.

## 6.2. Empirical Support?

Before relying on its normative recommendations, the model should earn credibility by comparing some of its predictions with empirical evidence. The main prediction is that a larger majority rule reduces investments. The European Union, with its various majority rules across issues as well as time, ought to provide empirical evidence. For example, are countries preparing more for deeper European integration (requiring a qualified majority) than for liberalization with third countries (requiring unanimity)? A second set of predictions claim that the investments also depend on the enforcement capacity, the project's value, the uncertainty and the heterogeneity. Are these in line with the evidence? With respect to strategic delegation, I have already argued that the model is consistent with the fact that the Commission and the Parliament are more pro-integration than the Council. Still, all these predictions deserve careful investigation.

If we find support for the two sets of predictions above, the normative recommendations for the optimal majority rules follow by deduction. For example, if the telecoms sector is liberalized fastest because of its highest value, then liberalization of other public utilities should be taken by a smaller majority rule. Until we know better, it would be interesting to study if such normative statements also hold as positive predictions. The concluding discussions in Sections 3.3, 4.2-4.4 suggested this to be the case, but obviously a great deal remains to be done. The negotiations on Europe's constitution will be followed with excitement.

## 6.3. Legislative Games

The legislative game in Section 2 is both simple and special. Although the extensions discussed in Section 4.3 do generalize the game, much remains to be done. For example, I abstracted from the possibility that the minority could make amendments or bribe members of the majority coalition, and the majority coalition was assumed to be stable. Though I discussed bicameral political systems, the EU is tricameral. At present, the European Parliament is much less powerful than the Council, but the Convention does suggest that the Parliament's role be strengthened. How will this influence the game?

A third extension could be to let a subgroup of members go ahead with the project alone (as is the case for the common currency), without the approval of others. The possibility for such "flexible" integration is currently a hot topic in the EU. At a first glance, this provides another benefit of becoming a winner of the project, and this possibility might be a substitute for a reduced majority rule.<sup>60</sup>

#### 6.4. Timing of the Vote

One political instrument, neglected above, is the timing of the legislative game. Fearing low investments, why not implement the project already at the constitutional stage? A project that has already been implemented, or committed to be so, will surely motivate members to adjust. This strategy is often applied by the EU, e.g. for its liberalization of gas. The disadvantage of this strategy is that reversing the project might be costly if it turns out to be bad ( $\theta$  low). Thus, this strategy creates a trade-off between efficient incentives (ex ante) and efficient selection of projects (ex post).

Another extension is to let time be continuous, and let members choose their investments at each point in time. Long before the vote, the uncertainty concerning future values is large, and all members may invest similar amounts. Closer to the vote, some members become certain about their political power at the legislative stage, while others become nervously unsure. Then, according to Proposition 9, investments are likely to diverge considerably.<sup>61</sup> If, in addition, the timing of the vote can be renegotiated, a time inconsistency problem is likely to arise. Close to the vote, investments diverge and are suboptimal for most members. Then, it is optimal to either vote right away, to give all incentives to adjust, or delay the vote to the future, to again make everyone uncertain about their political power at the legislative stage.

#### 6.5. Other Applications

Though the EU has been the leading example in the paper, the model is general and applies to many contexts. The anticipated project may, for example, be to stabilize national debt, as in Alesina and Drazen (1991). Ahead of this, each region might be able to reduce its own regional deficit by choosing the appropriate policy. Such policies will certainly affect its value of national stabilization at the legislative stage. The lower is the debt of a region, the more eager it is to stabilize debt also nationally, but the more it will have to compensate losers ill-prepared for tough financial policies. This generates a hold-up problem, and stabilization will be delayed. Applying Proposition 3 above, the solution is a lower majority rule. Then, stabilization can be implemented without compensating

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<sup>60</sup>As discussed by Berglöf, Burkart and Friebe (2003), the "threat" to go ahead alone reduces the hold-up problem when decisions are taken by unanimity. The possibility to form an inner organization is, to some extent, a substitute for a reduced majority rule and may become irrelevant when the majority rule is sufficiently reduced. Perhaps afraid of being excluded, CEPR (1999) reports that several candidate countries (particularly Hungary) is far ahead of many member countries when it comes to liberalizing the telecoms market.

<sup>61</sup>If this is solved by giving ill-prepared members more voting power, as suggested in Section 4.5, a moral hazard problem arises in advance.

all ill-prepared regions. Fearing to be excluded from the majority coalition, regions will increase their effort to reduce their debt.<sup>62</sup>

Majority rules are also important in corporate governance. Collective decisions by shareholders are typically taken by some majority rule. The project under consideration may be the firm's investment or production strategy (DeMarzo, 1993), or to act upon a takeover bid (Grossman and Hart, 1988, Harris and Raviv, 1988). In advance, shareholders may affect their value of the project by e.g. reducing their individual risk (aversion) by investing in other assets. As suggested by Propositions 2 and 4, the particular majority rule may influence the shareholders' investments, their incentives to delegation strategically, and whether they will truthfully reveal their preferences. Moreover, since the majority rule affects the relative payoff of status-quo biased risk averse shareholders vs. risk neutral shareholders, the equilibrium ownership will depend on the majority rule. The larger the majority rule, the more risk averse the owners will be.

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<sup>62</sup>Interestingly, parliamentary majority rules differ across countries. Mueller (1996) reports that e.g. Finland's constitution requires a two-thirds majority for all important decisions, and a five-sixths majority for decisions involving property rights.

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