Welfarism and the assessment of social decision rules

Claus Beisbart and Stephan Hartmann

University of Dortmund
London School of Economics

COMSOC 2006
Amsterdam, 8 December 2006

Motivation

- Which social decision rule should be applied in the Council of Ministers after the enlargement of the of the European Union?
- Past: Unanimity; Now: ?
- Considerations:
  - Large nations do not want to loose their veto power.
  - Small nations don't want to be marginalized.
- Difficult negotiations, e.g.
  - Sweden: The weights should be proportional to the square root of the population.
  - Response by Chirac: What's the political significance of the square root?
- Diagnosis: We need a *principled* account.
- Our proposal: Adopt a welfarist framework

Welfarism

- Main idea: Accepted proposals influence the welfare distribution in the federation.
- Example: freeway in Portugal
- Modeling assumptions:
  - The federation consists of m states. The i^{th} state has N_i inhabitants.
  - Each proposal is characterized by a utility vector $\mathbf{v} = (v_1, \ldots, v_m)$ with cardinal utilities v_j $(j = 1, \ldots, m)$
  - If $v_j > 0$, state j votes for the proposal, otherwise against it.
  - Apply a social decision rule $D \rightarrow$ acceptance or rejection.
  - If accepted, state j receives utility v_j. Else, no change.
  - Repeat this for other proposals $\rightarrow$ averaged utilities for each state.

Evaluation

- The resulting welfare distribution depends on the social decision rule.
- Task: Evaluate the welfare distribution according to certain principles. Here are two:

  Utilitarianism Decision rule D_1 is better than D_2, if the expected utility of the federation is larger under D_1 than under D_2.

  Egalitarianism Decision rule D_1 is better than D_2, if there is more equality in the distribution of the expected utilities across the federation under D_1 than under D_2.

Decision rules

Two types of social decision rules are discussed in the literature:

1. Theoretical rules: assign weights w_i proportional to N_i^α with $0 \leq \alpha \leq 1$. If the aggregated weights are above a certain threshold, the proposal is accepted, otherwise it is rejected.
2. Political rules: assign several weights to each state. These weights are aggregated separately.

Here are the rules we'll discuss in this talk ...

Theoretical rules

Remember: $w_i \sim N_i^\alpha$ with $N_i :=$ number of people living in state i.

(SME) Simple majority with equal weights ($\alpha = 0$).

(P50) Simple majority with square root weights ($\alpha = .5$).

(SMP) Simple majority with proportional weights ($\alpha = 1$).

Political rules

(Acc) This rule, which is formulated in the Accession Treaty and which builds on the Nice Treaty, is presently in force. It identifies three classes of weights, one with $\alpha = 0$ (threshold 50%), one with $\alpha = 1$ (62%), and one with an unsystematic weights (72%).

(Con) This rule is part of the Constitution that is presently in the process of ratification. It identifies two classes of weights, one with $\alpha = 0$ (threshold 58%) and one with $\alpha = 1$ (65%).

The Basic Model

- To address our main question, some modeling assumptions have to be made.
- Identify the decision rule that maximizes an appropriate utilitarian or egalitarian measure.
- Therefore we have two tasks:
  1. Model the decision making process
  2. Specify the measures

Modeling the decision making process

- Each proposal is characterized by a utility vector $\mathbf{v} = (v_1, \ldots, v_m)$ with cardinal utilities v_j. The v_j are values of a random variable V_j.
- We assume that the V_j are *independent* and *normally distributed* with mean μ and variance σ.
- If $v_j > 0$, state j votes for the proposal, otherwise against it. We introduce random variables Λ_j with values $\lambda_j = sign(v_j)$. $(\lambda_1, \ldots, \lambda_m)$ is called a *voting profile*.
- A decision rule D maps $(\lambda_1, \ldots, \lambda_m)$ to $\{0, 1\}$.
- So a person from state j receives the utility $u_j = v_j \times D(\lambda_1(v_1), \ldots, \lambda_m(v_m))$ from a decision on $\mathbf{v}$. The u_j are values of a random variable U_j.

- $E[U_j]$ are the expectation values of the random variables U_j.
- The $E[U_j]$ are given by

$$E[U_i] = \int \mathbf{dv}\, p(\mathbf{v})\, v_i\, D\left(\lambda_1(v_1), \ldots, \lambda_m(v_m)\right)$$

- Note that the integral over $\mathbf{v}$ is m-dimensional and that the decision rule D is a function of the voting profiles which are, in turn, a function of the v_is.
- If the V_j are independent, then

$$p(\mathbf{v}) = p_i(v_i) \cdots p_m(v_m)$$

Measures

Evaluate the resulting welfare distribution. Here are two welfarist principles:

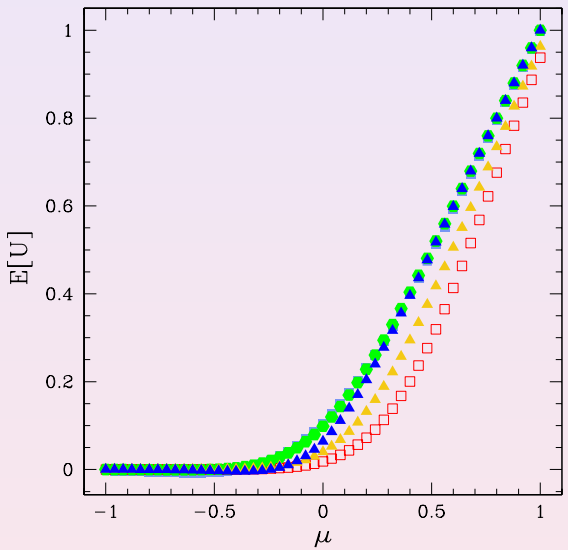
Utilitarianism Maximize the expected utility of a person in the EU:

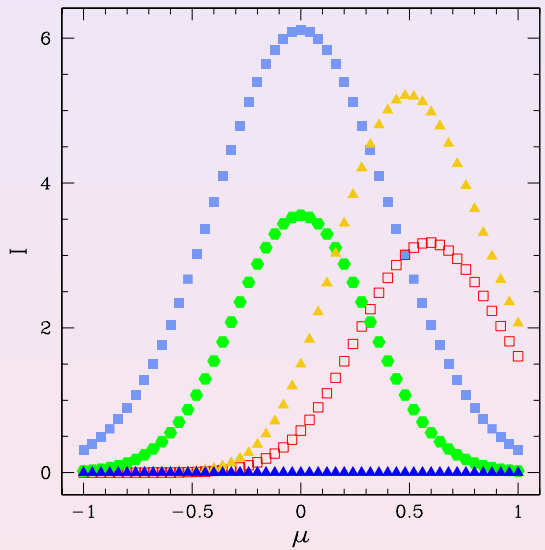
$$E[U] = \frac{1}{N} \sum_i N_i \, E[U_i] \, .$$

Egalitarianism Minimize the variance of the exp. utilities $E[U_i]$:

$$I := var(E[U_i]).$$

The expected utility of the federation and the variance





Filled light blue squares: SMP; filled green circles: P50 (square root weights); Filled dark blue triangles: SME. Red open squares: Acc. Filled orange triangles: Constitution.

Discussion

The most interesting (and realistic) range is around $\mu = 0$.

- In terms of *expected utility*, the theoretical rules do better than the political rules for $\mu = 0$. Ranking: SMP, P50, SME.
- In terms of *equality*, SMP does very badly. Next come P50 and the political rules. SME exactly equalizes the expected utilities for any value of μ.
- Analytical calculations: Barberà and Jackson (2006) showed that expected utility is maximized for proportional weights and a threshold that depends on μ.
- For more discussion of the Basic Model, see C. Beisbart, L. Bovens and S. Hartmann. "A utilitarian assessment of alternative decision rules in the Council of Ministers." *European Union Politics*, 6(4): 395–419 (2005).

The problem

- The assumption of uncorrelated utilities in the Basic Model is often not realistic. Rich states often do have similar interests (which will be reflected in correlated voting behavior) and so do large, Northern, agricultural etc. states.
- Will the ranking of the decision rules change if correlations are taken into account? I.e. how *stable* are our results? If the ranking depends sensitively on the correlations, then our model is useless, at least for political recommendations.
- Practical problem: How can correlations be taken into account? Shall we use the actual correlations that can be extracted from the voting behavior of the states, or shall we look at more idealized scenarios?
- Our goal: Study four different *correlation patterns*.

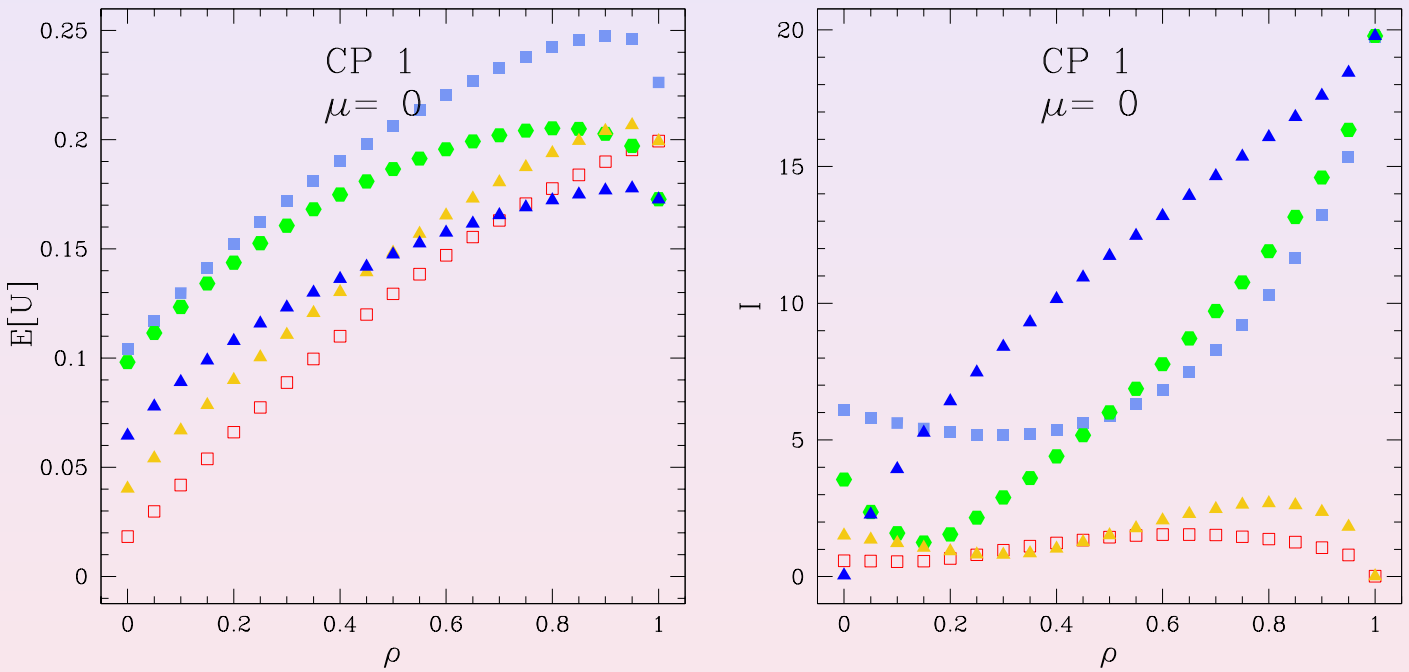
Modeling correlations

We assume that $p(\mathbf{v})$ is a multivariate normal. It is fully determined by its covariance matrix. The entries in this matrix are $c_{ij} = E[V_i V_j] - E[V_i]E[V_j]$, where one has to take the expectation value over the probability distribution p in order to calculate $E[\cdot]$.

CP1–2 States i, j from the same group are correlated with strength $c_{ij} = \varrho$. States i, j from different groups are uncorrelated ($c_{ij} = 0$). CP1: small/large. CP2: North/south

CP3–4 States i, j from the same group are correlated with strength $c_{ij} = \varrho$. States i, j from different groups are negatively correlated with $c_{ij} = -\varrho$ ($\varrho > 0$) reflecting the "zero-sum" character of (at least) some of the decision making progresses in the EU: The gains of one states equal the losses of another state. CP3: small/large. CP4: North/south

Expected utility of the federation and variance for CP1



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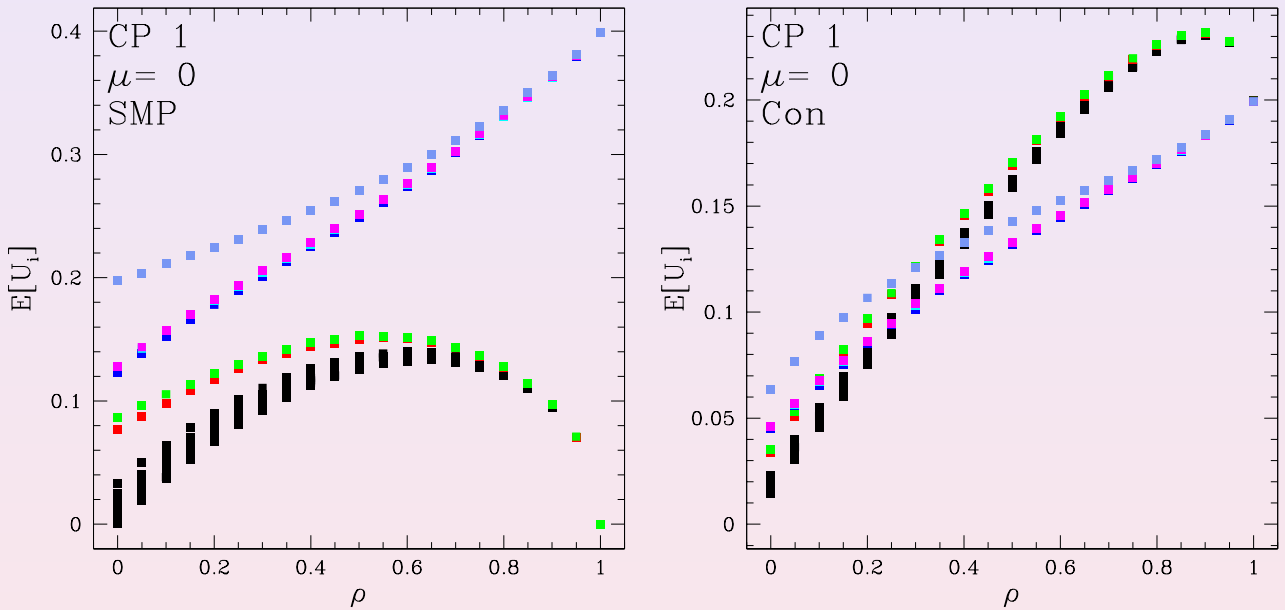
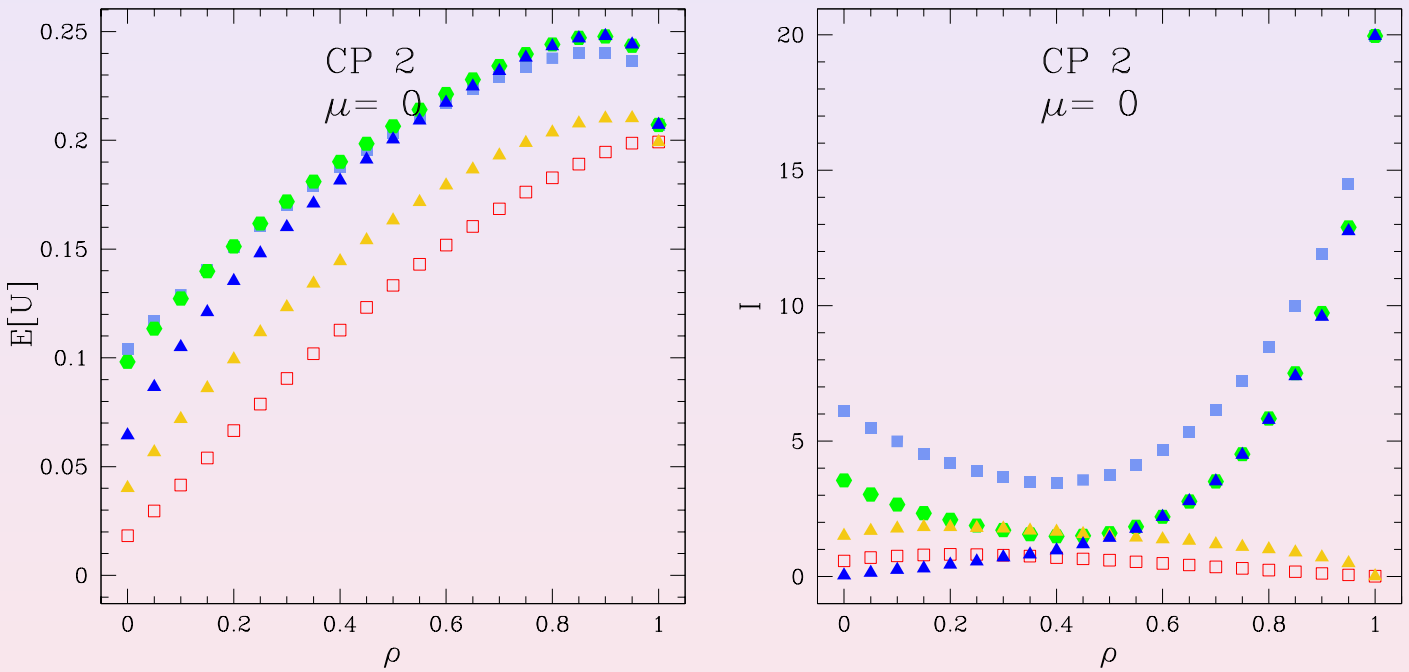
Expected utility for different states and rules for CP1



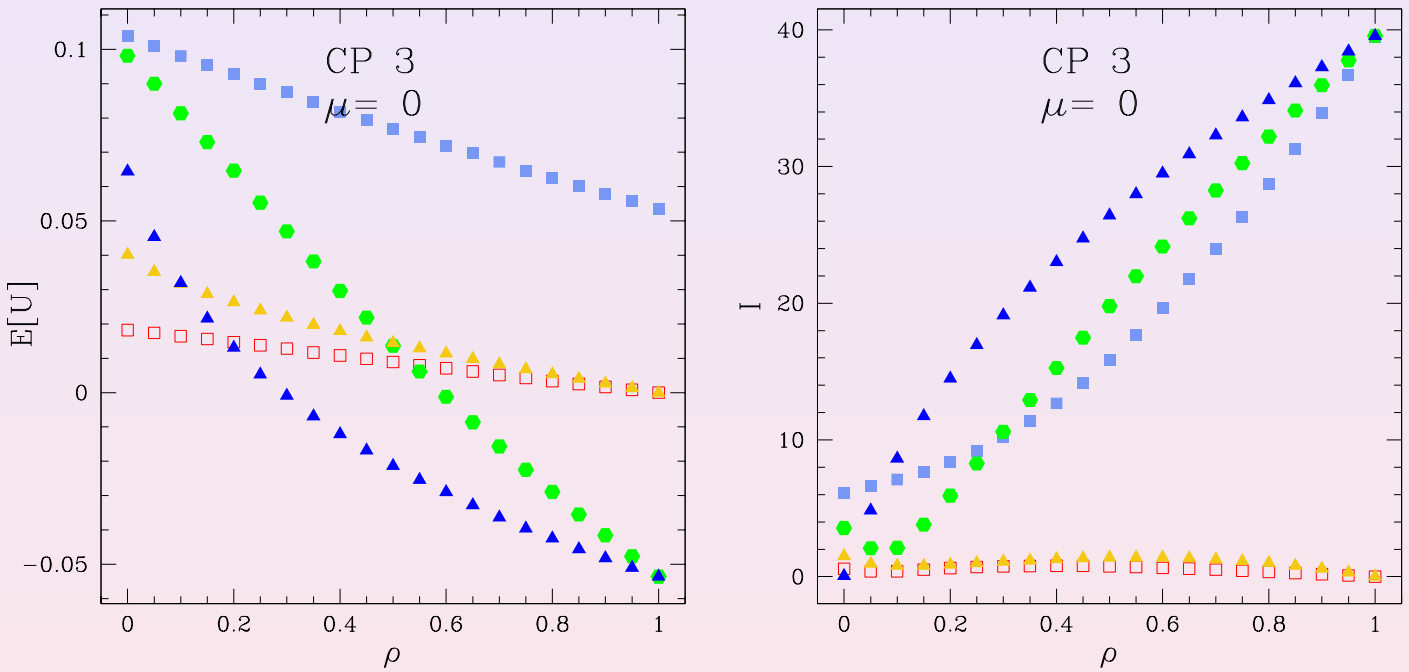
Left: SMP. Right: Constitution. Poland (red), Spain (green), Italy (dark blue), U.K (cyan), France (magenta), Germany (light blue), all other states (black).

Expected utility of the federation and variance for CP2



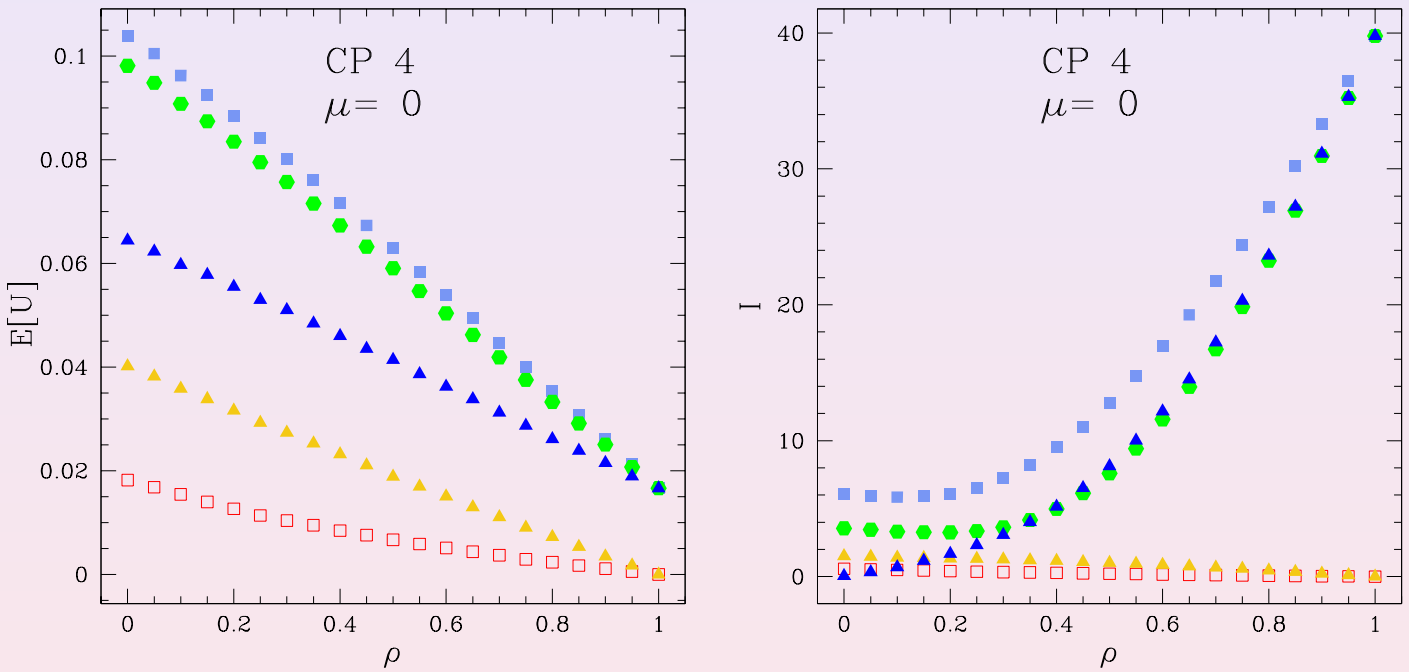
Filled light blue squares: SMP; filled green circles: P50 (square root weights); Filled dark blue triangles: SME. Red open squares: Acc. Filled orange triangles: Constitution.

Expected utility of the federation and variance for CP3



Filled light blue squares: SMP; filled green circles: P50 (square root weights); Filled dark blue triangles: SME. Red open squares: Acc. Filled orange triangles: Constitution.

Expected utility of the federation and variance for CP4



Filled light blue squares: SMP; filled green circles: P50 (square root weights); Filled dark blue triangles: SME. Red open squares: Acc. Filled orange triangles: Constitution.

Discussion

- The ranking of the decision rules in terms of expected utility is fairly stable.
- SME, which minimizes inequality under the default model, is worse than the political rules for all correlation patterns and a large range of values of correlation strengths ρ.
- Note that the political rules have higher acceptance thresholds and are thus less permissible.

Conclusions

1. Rankings are fairly stable in terms of expected utility.
2. Utlitarianism and egalitarianism pull in different directions. Whereas political rules with high acceptance thresholds tend to do better in maximizing the expected utility of the federation, theoretical rules are superior in achieving equality.
3. As both principles cannot be satisfied at the same time (at least by the rules studied in this paper), one has to strike a compromise. For vanishing correlations, the rule SME seems to be a reasonable candidate: It yields no inequality at all and is at least better than the political rules in terms of expected utility. Unfortunately, this result does not hold anymore for finite correlations, where SME may produce inequalities that are much larger than the inequalities under political rules.