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Are World Leaders Loss Averse?

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Abstract

We focus on the preferences of a salient group of highly-experienced individuals who are entrusted with making decisions that affect the lives of millions of their citizens, heads of government. We test for the presence of a fundamental behavioral bias, loss aversion, by examining heads of governments'choice of decision rules for international organizations. Loss averse leaders would choose decision rules that oversupply negative (blocking) power at the expense of positive power (to initiate affirmative action), causing potential welfare losses through harmful policy persistence and reform deadlocks. If loss aversion is muted by experience and high-stakes it may not be exhibited in this context. We find evidence of significant loss aversion implied in the Qualified Majority rule of the Treaty of Lisbon, when understood as a Nash bargaining outcome. World leaders may be more loss averse than the populous they represent.

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1 Introduction

Loss aversion is the notion that people are more sensitive to perceived losses than to commensurate gains. Since its formal introduction in Kahneman and Tversky (1979), loss aversion has been applied to a great variety of otherwise puzzling phenomena including the equity premium puzzle (Benartzi and Thaler, 1995), asymmetric price elasticities (Hardieet al.,

meta analysis of Brown et al. (2024) suggests that, on average, people are around 1.8–2.0 times more sensitive to losses than to equivalent gains – a degree of status quo bias may be socially desirable. Consistent with this notion, some degree of status quo bias is a ubiquitous feature of the decision rules used in IOs[2]. If, however, elected leaders exhibit motion, and those in favor must also represent at least 65 percent of European Union (EU) citizens. Alternatively, a motion also passes if three or fewer countries vote against it. To rationalize this decision rule as a bargaining outcome requires estimates of loss aversion that are (well) above two, providing evidence that EU leaders are loss averse in both an absolute and relative sense. Consistent with our findings, Axel Moberg, a witness to the negotiation of the earlier Nice QM rule as a member of the Swedish delegation, documents how member states were largely preoccupied with “...the ability of groups of like-minded states to block decisions”(Moberg, 2002: 261), i.e., a negative concept of power.[4] As a robustness check, we show that our qualitative finding of absolute and relative loss aversion among world leaders also holds for the design of earlier negotiations of QM rules back to 1958, and is also robust to perturbations of the baseline methodology.

Our model predicts that, in policy domains where countries are sufficiently likely to face losses, decision by unanimity will be the bargaining outcome. By contrast, majority decision rules that do not require unanimity emerge for policy domains where gains are sufficiently likely. The threshold probability for gaining –which governs whether the bargaining solution is a majority or unanimity rule –is an increasing function of loss aversion. Accordingly, as an implication of our analysis, were –counterfactually –EU leaders to be merely as loss averse as the population average, or even loss neutral, they would potentially use the QM rule in some policy domains where they presently adopt decision by unanimity.

Our paper contributes to a relatively thin literature on elite decisionmaking. As Hafner-Burton et al. (2013) explain, elites are difficult to study directly because “...they are generally

More broadly, we provide a further exploration of the role of behavioral economics in the nexus of economics and politics (see, e.g., Levy, 2003; Boettcher, 2004; Stein, 2017). Our analysis also adds to the wider formal analysis of the QM rule of the EUCO (e.g., Felsenthal and Machover, 2001, 2004, 2009). As our findings suggest that leaders exhibit relative (as well as absolute) loss aversion, our findings also have implications for the literature on the optimal selection of representatives in delegated democracies (e.g., Harstad, 2010).

The plan of the paper is as follows: Section 2 develops a theoretical framework for understanding positive and negative power under a given decision rule, and constructs a bargaining model over the choice of a decision rule. Section 3 describes our implementation of the bargaining model to the 2007 negotiation of the Lisbon QM rule, and section 4 gives the results. Section 5 extends the analysis of the Lisbon QM rule to earlier QM rules, and offers other robustness checks. A discussion of our findings is given in section 6. The Appendix details a novel approach to the computation of voting power measures, developed for this analysis. The figures appear at the very rear.

2 Model

In this section we model the adoption of a decision rule by an IO as the outcome of a grand bargain between its member states. We consider a voting body N comprised of $N > 1$

passes. Accordingly, a *for*-country, i, will vote *for*, hence $i \in F$. For an against-country j, $j \notin F$

is defined as $U(\quad W) > U(\quad W)$ for all $W > 0$.[7] This condition holds if and only if > 1. Substituting (3) in (2) we obtain

$$(L_i) = \Pr(i \in F; w(F) = \text{pass})\, V\left(W^F\right) \qquad \Pr(i \notin F; w(F) = \text{pass})\, V\left(W^A\right). \qquad (4)$$

From behind a veil of ignorance as to the motion to be decided, the monetary payoffs are set as $W^F = W^A = W$, so that the loss from implementing an unfavorable motion equals the gain from implementing a favorable motion. This is not to deny the existence of payoff variability across motions, but rather harks to Bernoulli's principle of insufficient reason, according to which, in the absence of a compelling a-priori reason for assigning different values, equality should be presumed. Equation (4) then reduces to

$$(L_i) = \{\Pr(i \in F; w(F) = \text{pass}) \qquad \Pr(i \notin F; w(F) = \text{pass})\}\, V(W). \qquad (5)$$

A notable implication of (5) is that preferences over monetary outcomes, $V(W)$, enter the Nash product as a multiplicative factor, and consequently play no role in the determination of the NBS. Thus, one can estimate the coefficient of loss aversion independently of the risk preferences contained in $V(W)$.

of power, however, is that they mix power with luck. In particular, if the unconditional probability of a motion passing is denoted by $\Pr(\text{pass}) \quad !$, then it is only the differential $\Pr(\text{pass} j i \; 2 \; F) \quad !$ that reflects genuine positive power, separate from luck. Similarly, pure negative power is reflected in the differential $\Pr(\text{fail}\ j i \not 2 \; F) \quad [1 \quad !]$. Netting out luck, we arrive at pure measures of positive power (${}^{+}_{i}$) and negative power (${}_{i}$):

$$ {}^{+}_{i} = \frac{\Pr(\text{pass} j i \; 2 \; F) \quad !}{1 \quad !}; \qquad {}_{i} = \frac{\Pr(\text{fail}\ j i \not 2 \; F) \quad [1 \quad !]}{!}: \tag{6} $$

Coleman (1971) considers ${}^{+}_{i}; \; {}_{i}; !$ under the twin assumptions that (i) all countries vote independently; and (ii) that each country votes for and against with equal probability. We generalize the setting of Coleman (1971) by relaxing assumption (ii) to allow the probability of voting for to differ from that of voting against.[9;10]

Proposition 1 The expected utility of country i, before the motion is known, is given by

$$ (\; L_i) = \quad p \; ! \; + [1 \quad !] \; {}^{+}_{i} \qquad [1 \quad p] ! \quad 1 \qquad {}_{i} \qquad V(W): $$

Proof.

probability that the gain utility $V(W)$ is realized. Negative power also increases expected utility, but by reducing the probability that the loss utility $V(W) < 0$ is realized. To see how loss aversion interacts with positive and negative power note that the cross derivatives of expected utility are

$$\frac{@^2 (L_i)}{@_i^+ @} = 0; \qquad \frac{@^2 (L_i)}{@_i @} = [1 \quad p] !V \quad W^A > 0: \tag{7}$$

Importantly, interacts positively with negative power, but not with positive power. It follows that, as is increased, negative power weighs more heavily in the determination of expected utility relative to positive power.

2.2 Bargaining over Decision Rules

Owing to their central role, decision rules must be adopted as the consensual outcome of negotiations among all members of an IO. The consensual nature of the outcome not withstanding, the negotiations can commonly be intense, with countries robustly defending their interests. Accordingly, we model the observed decision rules as the solution of a (generalized) Nash bargain among the members of an IO. To view the NBS as a descriptive account of the process by which decision rules are selected, we follow a vast economic literature in interpreting the NBS as the outcome of a strategic bargaining process.[11] The NBS, however, also has desirable normative properties (Nash, 1950). In particular, the outcome of the Nash bargain we consider yields an outcome that is Pareto efficient in an ex-ante sense (i.e., from behind a veil of ignorance concerning the motion to be decided). This feature of the model connects, therefore, with a literature that advocates ex-ante utility maximization as a normative criterion for decision rule design (Barberà and Jackson, 2006; Maggi and Morelli, 2006; Rae, 1969).[12]

What would be the outcome if heads of government were unable to agree on a decision rule? Here we suppose that, in the absence of an agreement, leaders resort to the unanimity

unanimity rule is typically Pareto dominated by majority decision rules (see, e.g., Bouton et al., 2017, 2018) it is a focal choice of disagreement outcome as, uniquely among decision rules, it ensures that no country can ever experience a loss: collective action is taken only if it is a Pareto improvement (Buchanan and Tullock, 1962).

If the unanimity decision rule is adopted, each country obtains a (common) expected utility

$$(D) = p^N V(W); \tag{8}$$

where equation (8) follows from the observation that only in the event that all countries vote for , which occurs with probability p^N, is an affirmative outcome reached. In all other instances, the motion fails and the status quo is maintained.

3 Estimation

The model of section 2 can be applied to a class of decision rules, widely observed empirically, that make use of one or more "quotas". Suppose each country $i \in N$ possesses a set of $Q \geq 1$ characteristics $\{c_{ij}\}_{j=1}^{Q}$. The sum of characteristic j over the members of a coalition F we denote by $c_j^F = \sum_{i \in F} c_{ij}$. Quota-based decision rules are of the form

$$w(F) = \text{pass if and only if } c_j^F \geq q_j^F \text{ for all } j;$$

where q_j^F is a quota in respect of characteristic j, satisfying

$$\begin{aligned} q_j^F &\in (0; c_j^N] \text{ for all } j; F; \\ q_j^F &\in (c_j^N/2; c_j^N] \text{ for at least one } j, \text{ given } F, \text{ and for all } F. \end{aligned} \tag{11}$$

Implicitly, therefore, the Lisbon rule is a quota-based decision rule with $Q = 2$ quotas – a population quota q_1^F and a cardinality quota q_2^F – given by

$$q_k^F = \begin{array}{ll} dt_k e & \text{if } jFj < dt_3 e \\ c_k^F & \text{otherwise} \end{array} \qquad k\ 2\ f\ 1; 2g; \tag{13}$$

where c_1^F is the aggregate population of the members of F and $c_2^F = jFj$. Note that if $jFj \quad d\ t_3 e$, such that condition C2 is met, then both quotas are met ($c_1^F = q_1^F$ and $c_2^F = q_2^F$). The thresholds $f\, t_1; t_2; t_3 g$ chosen by EU leaders are given by

$$t_1^{\text{Lisbon}} = 0{:}65 c_1^{EU}; \qquad t_2^{\text{Lisbon}} = 0{:}55 N; \qquad t_3^{\text{Lisbon}} = N \quad 3{:} \tag{14}$$

As of 2007 – when the negotiation of the Lisbon rule took place – EU membership stood at $N = 27$, with an aggregate population of approximately $c_1^{EU} = 493$ million people.[14] Thus, the thresholds in (14) took the values

t_1^{Lisbon} 320dng wipe2-1.793 Td [(2)]TJ/F22 11.9552 Tf 4.732 1.793 Td [(;)-167(t)]TJ/F

Let $t_1(\ )$ be the NBS for t_1 at each coefficient of loss aversion. The NBS for $f\, t_2; t_3 g$ will then be determined by (16). We look for 2 such that

$$2 \quad , \quad t_1(\quad) = t_1^{\text{Lisbon}} :$$

The set may be either an interval or a singleton, as $t_1(\ )$ is a step function under the determination of quotas in (13). The stepped form of t_1 in response to changes in is because the quotas in (13) depend only on the integer part of the underlying thresholds. To minimize this source of stickiness between t_1 and we allow for non-integer threshold

new Lisbon rule. If so, such a belief would have been ex-post rational, for (our) estimates of `for`-voting under the Lisbon QM rule (based on the universe of VoteWatch Europe data post 1st November 2014) put the proportion of `for` votes at 97.1 percent.[18]

While it is tempting to equate the parameter p with the observed frequency of `for`-voting, a notable feature of our data on EUCO voting that augurs against such an approach is that no vote is observed to fail under a QM rule (Nice or Lisbon). This appears indicative of a tendency within the European Commission (and the executive organs of other IOs) to bring forward only proposals that are expected to pass. By contrast, our model envisages an environment in which motions are not filtered endogenously in the shadow of the decision rule. To account for this point, we treat the empirical proportion of votes that are `for` as an estimate of the conditional probability $\Pr(i \in F | \text{pass})$ rather than of the unconditional probability $\Pr(i \in F)$. Then p is the solution to the equality

$$\frac{p}{1 - \omega(p)} = \Pr(i \in F | \text{pass}). \tag{20}$$

Under the Nice QM rule some 97.49 percent of votes are `for` votes. Equating $\Pr(i \in F | \text{pass})$ with this statistic, we compute the solution to the equality in (20) as $p = 0.9727$. We use this estimate in what follows.

4 Results

Figure 2 plots the population threshold at the NBS, $t_1(\lambda)$, for $\lambda \in [1, 7]$. $t_1(\lambda)$ is increasing in λ, for greater focus on losses relative to gains induces a stronger concern for negative power relative to positive power. Our estimate of the coefficient of loss aversion, $\lambda \in \Lambda$, is located in Figure 2 where $t_1(\lambda)$ coincides with the choice of EU leaders, t_1^{Lisbon}, on the interval $\lambda \in \Lambda = [5.751, 6.328]$. Thus, our finding points to both absolute and relative loss aversion on the part of EU leaders.

Figure 2 – see p. 31

The critical value $\bar{\lambda}(p)$ is found as $\bar{\lambda}(p) = 18.2$; for $\lambda > 18.2$ Malta (the least populous EU member) is sufficiently loss averse that it prefers the unanimity rule to any QM rule. Accordingly, for $\lambda \geq 18.2$ the NBS is the unanimity rule.

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[18] For further discussion of voting patterns in the EUCO see Hosli et al. (2018).

5 Extensions and Robustness

In this section we explore the generality and robustness of our findings in section 4.

5.1 Other EU Decision Rule Negotiations

Our findings in respect of the Lisbon rule might reflect circumstances unique to the negotiation of this rule, and therefore not extend to the choice of decision rules more generally. To explore this point, we repeat the methodology of section 3 for all EU QM decision rules dating back to their introduction in 1958. As detailed in Felsenthal and Machover (1997), between 1958-2004 the EU employed five different decision rules (EU1 –EU5) each of which took the form of a single quota over a set of weighted votes. The Nice QM rule (EU6), employed between 2004 and 2014, extended this structure to a 3-quota (weighted votes, cardinality, and population) rule (Felsenthal and Machover, 2001).[19] To analyze the Nice rule, therefore, we proceed in a similar spirit to the Lisbon rule by varying the population quota, holding fixed its ratio with the weighted votes and cardinality quotas.

The results of this exercise are shown in Table 1.

Decision Rule	
EU1 (1958-1973)	$\in (1.98, 2.03)$
EU2 (1973-1981)	3.15
EU3 (1981-1986)	3.48
EU4 (1986-1995)	2.91
EU5 (1995-2004)	$\in (3.21, 3.80)$
EU6 (2004-2014)	5.62

Table 1: Estimates of loss aversion for EU QM rules 1958-2008

The interval estimates for in Table 1 arise when the NBS corresponds with the empirically observed decision rule at a "plateau", while point estimates arise when correspondence with

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[19] In this taxonomy, the Lisbon rule analyzed in section 3 corresponds to EU7.

6 Discussion and Conclusion

In this study we used the way in which world leaders choose voting systems for international organizations (IOs) to infer their coefficient of loss aversion. In particular, we consider the design of the QM rule in the Treaty of Lisbon, which was negotiated by EU leaders in 2007. Our approach models the negotiations over the Lisbon rule as a (Nash) bargain, and estimates the coefficient of loss aversion independently of risk preferences. Given that EU leaders ringfenced the use of their QM rule to policy domains known a-priori to have high levels of agreement between members, the thresholds chosen for motions to pass suggests a very strong concern for blocking power.[20] Our findings suggest that world leaders are loss averse in the absolute sense of weighing losses more heavily than equivalent gains, and also in the relative sense of exhibiting a stronger aversion of losses than characterizes the populations they represent.

Designing decision rules for IOs inherently entails high-stakes, and heads of government are highly experienced decisionmakers. These features might suggest that heads of government would not exhibit loss aversion. Our findings go contrary this suggestion, however, and are instead consistent with a literature arguing that even experts remain prone to behavioral biases (Foellmi et al., 2016; Pope and Schweitzer, 2011). Professional golfers, for instance, are significantly less accurate with birdie putts than with otherwise similar putts for par. Importantly, our estimate of loss aversion for heads of government is higher than is typically found in the literature. We see two competing interpretations of this finding, each with distincd17.933 Td [(dt)8(252lm79)11(n)11((t)8(a9)11(s)8(s)-2o11(s)8(s1(o)38(v)c7(,)-492(wa)11n)11(r) aversion – as the citizens they represent (Heß et al., 2018; Sheffer et al., 2018). Both of these studies find evidence that representatives are less risk averse than the citizens they represent. Whether, however, risk aversion correlates at the individual level with loss aversion remains unclear.[21] As such, the findings for risk aversion, while suggestive, cannot be assumed to hold for loss aversion. To the extent that present electoral systems do select more loss averse candidates, the key to avoiding the negative consequences of excessive loss aversion may be to instead implement electoral processes that match the preferences of representatives and citizens as closely as possible. The types of electoral processes that meet this desideratum are discussed in, e.g., Martin and Hug (2018).

An alternative explanation of our findings is that heads of government are, in general, no more or less loss averse than the population at large, but that situational features specific to the high-stakes international negotiations we consider may have induced greater than normal loss aversion. In particular, there is evidence that the exhibition of behavioral biases in decision-making may be non-monotonic in the size of the stakes. Biases are observed to decrease for moderate stakes relative to small stakes, yet an emerging literature documents a tendency for even experienced decisionmakers to "choke" when faced with very high stakes (Baumeister, 1984; Dohmen, 2008; Ariely et al., 2009). Such decision-makers are observed to exhibit greater behavioral bias than when making decisions over lower stakes. To the extent this explanation holds, steps might be taken that act to systematically reduce the manifestation of loss aversion. Evidence suggests that decisionmakers exhibit less loss aversion when making decisions for others (Polman, 2012; Andersson et al., 2016; Füllbrunn and Luhan, 2017). This suggests a new argument for the role of bureaucrats in high-stakes decisionmaking in addition to those identified previously (see, e.g., Alesina and Tabellini, 2007).[22] To test between explanations, note that this explanation suggests that loss aversion would be lower for lower-ranked national and local political representatives charged with making less consequential decisions than are heads of government. By contrast, under the former explanation, all political representatives – not just heads of government – should display heightened loss aversion.

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[21] For contrasting evidence on this point see, e.g., Baek et al. (2017) and Charpentier et al. (2017).

[22] The final negotiation of the Lisbon QM rule, and other earlier EU QM rules, was between EU leaders, with minimal presence of officials. In personal correspondence, Axel Moberg, the earlier cited witness to the Nice QM rule negotiations, describes how "high-ranking officials were often indisposed to enter into discussion of the merits of various proposals since this was a matter for "higher up"." These points, and that our estimate of loss aversion is relatively high, are suggestive of a limited bureaucratic influence on such decisions at present.

From a broader perspective, given that decision rules are not only a feature of EU decisionmaking, but are pervasive in other international, national and local contexts, the wider public policy implications of our analysis are potentially significant. In an effort to prevent behavioral biases distorting the design of such decision rules we echo the call of Hosli and Machover (2004) for a dialogue between academics and practitioners in order to allow for more informed choices.

References

Aghion, P., Alesina, A. and Trebbi, F. (2004). "Endogenous political institutions", *Quarterly Journal of Economics*, 119(2), 565–612.

Alesina, A. and Drazen, A. (1991). "Why are stabilizations delayed?", *American Economic Review*, 81(5), 1170–1188.

Alesina, A. and Passarelli, F. (2019). "Loss aversion in politics", *American Journal of Political Science*, 63(4), 936–947.

Alesina, A. and Tabellini, G. (2007). "Bureaucrats or politicians? Part I: A single policy task", *American Economic Review*, 97(1), 169–179.

Beisbart, C., Bovens, L. and Hartmann, S. (2005). “A utilitarian assessment of alternative decision rules in the Council of Ministers”, European Union Politics, 6(4), 395–418.

Benartzi, S. and Thaler, R. (1995). “Myopic loss aversion and the equity premium puzzle”, Quarterly Journal of Economics, 110(1), 73–92.

Bilbao, J., Fernández, J., Losada, A. and López, J. (2000). “Generating functions for computing power indices efficiently”, Top, 8(2), 191–213.

Binmore, K., Rubinstein, A. and Wolinsky, A. (1986). “The Nash bargaining solution in economic modelling”, RAND Journal of Economics, 17(2), 176–188.

Blake, D. and Payton, A. (2015). “Balancing design objectives: Analyzing new data on voting rules in intergovernmental organizations”, Review of International Organizations, 10(3), 377–402.

Boettcher, W. (2004). “The pre(5(g)-448(.)-45c12(a)10(s11(e6-342(f)7(o)102:)-294(p)11(re)9((5(g)-448

Freixas, J. (2005). "Banzhaf measures for games with several levels of approval in the input and output", Annals of Operations Research, 137(1), 45–66.

Füllbrunn, S. and Luhan, W. (2017). "Decision making for others: The case of loss aversion", Economics Letters, 161(1), 154–156.

Gächter, S., Johnson, E. and Herrmann, A. (2022). "Individual-level loss aversion in riskless and risky choices", Theory and Decision, 92(1), 599–624.

Galloway, D. (2001). The Treaty of Nice and Beyond: Realities and Illusions of Power in the EU, Sheffield: Sheffield Academic Press.

Goette, L., Huffman, D. and Fehr, E. (2004). "Loss aversion and labor supply", Journal of the European Economic Association, 2(2-3), 216–228.

Golub, J. (2007). "Survival analysis and European Union decision-making", European Union Politics, 8(2), 155–179.

Hafner-Burton, E., Hughes, D. and Victor, D. (2013). "The cognitive revolution and the political psychology of elite decision making", Perspectives on Politics, 11(2), 368–386.

Hardie, B., Johnson, E. and Fader, P. (1993). "Modeling loss aversion and reference dependence effects on brand choice", Marketing Science, 12(4), 378–394.

Harsanyi, J.C. (1956). "Approaches to the bargaining problem before and after the theory of games: A critical discussion of Zeuthen's, Hicks', and Nash's theories", Econometrica, 24(2), 144–157.

Harstad, B. (2010). "Strategic delegation and voting rules", Journal of Public Economics, 94(1-2), 102–113.

Hartman, R., Doane, M. and Woo, C. (1991). "Consumer rationality and the status quo", Quarterly Journal of Economics, 106(1), 141–162.

Heard, A. and Swartz, T. (1998). "Empirical Banzhaf indices", Public Choice, 97(4), 701–707.

Heinemann, F. (2004). "Explaining reform deadlocks", Applied Economics Quarterly, 55(S), 9–26.

Herweg, F., Müller, D. and Weinschenk, P. (2010). "Binary payment schemes: Moral hazard and loss aversion", American Economic Review, 100(5), 2451–2477.

Herweg, F. and Schmidt, K. (2015). "Loss aversion and inefficient renegotiation", Review of Economic Studies, 82(1), 297–332.

Heß, M., Scheve, C., Schupp, J., Wagner, A. and Wagner, G. (2018). "Are political representatives more risk-loving than the electorate? Evidence from German federal and state parliaments", Palgrave Communications, 4, 60.

Hix, S., Frantescu, D. and Hagemann, S. (2022). VoteWatch Europe European Parliament and EU Council Voting Data.

Hjorth, K. and Fosgerau, M. (2011). "Loss aversion and individual characteristics", Environmental and Resource Economics, 49(4), 573–596.

Hooghe, L. and Marks, G. (2015). "Delegation and pooling in international organizations", Review of International Organizations, 10(3), 305–328.

Hosli, M. (2007). "Explaining voting behavior in the Council of the European Union", Paper presented at the First World Meeting of the Public Choice Societies, Amsterdam.

Hosli, M. and Machover, M. (2004). "The Nice Treaty and voting rules in the Council: A reply to Moberg (2002)", Journal of Common Market Studies, 42(3), 497–521.

Hosli, M., Plechanovová, B. and Kaniovski, S. (2018). "Vote probabilities, thresholds and actor preferences: Decision capacity and the Council of the European Union", Homo Oeconomicus, 35(1-2), 31–52.

Huysmans, M. (2019). "Enlargement and exit: The origins of Article 50", European Union Politics, 20(2), 155–175.

Inesi, M. (2010). "Power and loss aversion", Organizational Behavior and Human Decision Processes, 112(1), 58–69.

Kahneman, D. and Tversky, A. (1979). "Prospect theory: An analysis of decision under risk", Econometrica, 47(2), 263–291.

Kaniovski, S. and Leech, D. (2009). "A behavioral power index", Public Choice, 141(1), 17–29.

Karle, H., Engelmann, D. and Peitz, M. (2022). "Student performance and loss aversion", Scandinavian Journal of Economics, 124(2), 420–456.

Karle, H., Kirchsteiger, G. and Peitz, M. (2015). "Loss aversion and consumption choice: Theory and experimental evidence", American Economic Journal: Microeconomics, 7(2), 101–120.

Knetsch, J. and Sinden, J. (1984). "Willingness to pay and compensation demanded: Experimental evidence of an unexpected disparity in measures of value", Quarterly Journal of Economics, 99(3), 507–521.

Köbberling, V. and Wakker, P. (2005). "An index of loss aversion", Journal of Economic Theory, 122(1), 119–131.

König, T. (2007). "Convergence or divergence? From ever-growing to ever-slowing European decision-making process", European Journal of Political Research, 46(3), 417–444.

Kőszegi, B. and Rabin, M. (2006). "A model of reference-dependent preferences", Quarterly Journal of Economics, 121(4), 1133–1165.

Kőszegi, B. and Rabin, M. (2007). "Reference-dependent risk attitudes", American Economic Review, 97(4), 1047–1073.

Laruelle, A. and Valenciano, F. (2010). "Egalitarianism and utilitarianism in committees of representatives", Social Choice and Welfare, 35(2), 221–243.

Levitt, S. and List, J. (2008). “Homo economicus evolves”, Science, 319(5865), 909–910.

Levy, J. (2003). “Applications of prospect theory to political science”, Synthese, 135(2), 215–241.

List, J. (2003). “Does market experience eliminate market anomalies?”, Quarterly Journal of Economics, 118(1), 41–71.

List, J. (2011). “Does market experience eliminate market anomalies? The case of exogenous market experience”, American Economic Review, 101(3), 313–317.

List, J. and Mason, C. (2011). “Are CEOs expected utility maximizers?”, Journal of Economics, 162(1), 114–123.

Lockwood, B. and Rockey, J. (2020). “Negative voters? Electoral competition with [illegible]

Appendix: Computing Positive and Negative Power

We describe here an e¢ cient approach to the computation of the measures $_i$; ^+_i $_{i2N}$ for the Lisbon QM rule. Whereas the brute force approach to the computation of these measures is of order 2^N complexity, our approach reduces this to a complexity of order $2^{N=2}$. The method computes exact (machine precision) values with a large proportion of the computation occurring only once at the start. We compute $_i$; ^+_i $_{i2N}$ via the relations

$$ {}^{+}_{i} = \frac{1 \quad p}{1 \quad !} {}_{i}; \qquad {}_{i} = \frac{{}^{h}p^{i}}{!} {}_{i}; $$

where $_i$ is the a-priori probability that country i is critical (in the sense of footnote 10), which therefore requires us to compute the set of measures f $_i$ g$_{i2N}$. The crux of the problem is to count (in a weighted fashion) how often a given country is critical.

Let f $_i$ g$_{i2N}$ denote the set of population proportions, and e denote its median. Let P_F = P$_{i2F}$ $_i$ denote the population share of the members of F . We bifurcate N into two subsets: N = f i : $_i$ 6 eg$_{i2N}$ and N$^+$ = f i : $_i$ > eg$_{i2N}$. That is, N is the least populous half of

We use s and t to determine the probability weight of coalitions in which a given member is critical under each condition. First, for brevity, define

$$N_i^{\#} \quad N^{\#} \setminus \{i\};$$

$$s_i^{\#}(k;P) \quad s\left(k;P;N_i^{\#}\right);$$

$$t_i^{\#}(k;P) \quad t\left(k;P;N_i^{\#}\right);$$

where $\# \in \{\;;+\}$. We then compute the probability that member i is critical under condition j, ${}_{ij}$, as

$$ {}_{ij} = \sum_{F \; N_i^{+}} {}_{ij}(F);$$

where

$$\begin{aligned}
{}_{i1}(F) = {} & t_i \;\; \lceil t_2 \rceil \;\; |F|; \lceil t_1 \rceil \;\; c_1^F \;\; c_{i1} \;\; t_i \;\; \lceil t_3 \rceil \;\; |F|; \lceil t_1 \rceil \;\; c_1^F \;\; c_{i1} \\
& t_i \;\; \lceil t_2 \rceil \;\; |F|; \lceil t_1 \rceil \;\; c_1^F \;\; t_i \;\; \lceil t_3 \rceil \;\; |F|; \lceil t_1 \rceil \;\; c_1^F \;\; ; \\
{}_{i2}(F) = {} & s_i\left(\lceil t_2 \rceil \;\; 1 \;\; |F|; 1\right) \;\; \lim_{\varepsilon \downarrow 0} s_i\left(\lceil t_2 \rceil \;\; 1 \;\; |F|; \lceil t_1 \rceil \;\; \varepsilon \;\; c_1^F\right); \\
{}_{i3}(F) = {} & s_i\left(\lceil t_3 \rceil \;\; 1 \;\; |F|; 1\right); \\
{}_{i4}(F) = {} & s_i\left(\lceil t_3 \rceil \;\; 1 \;\; |F|; \lceil t_1 \rceil \;\; c_{i1} \;\; c_1^F\right).
\end{aligned}$$

We may then compute

$$ {}_{i} = \sum_{j=1}^{4} {}_{ij}.$$

Figures

Figure 1: Visual representation of the set of winning coalitions under the Lisbon QM decision rule. The heavy-shaded region is infeasible. The light-shaded region is the set of winning coalitions.

Figure 2: The bargaining outcome for different values of .