

Prospect Theory in Political Decision Making: A Critical Assessment

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Abstract

Prospect theory—a psychologically founded account of decision making under risk and uncertainty—revolutionized how economists and, somewhat later, political scientists thought about decision making under uncertainty. Conceptually, prospect theory is based on two central notions: *reference-dependence*, that is the notion that the utility of outcomes is defined over changes in outcomes from a reference point instead of over absolute outcome levels; and *likelihood-dependence*, that is the notion that people distort probabilities non-linearly when making a decision. Likelihood-dependence gives rise to the *possibility* and *certainty effects*—changes in probabilities are given much more weight if they fall towards the probability endpoints than if they fall into intermediate probability ranges. Reference-dependence gives rise to the *reflection effect*, predicting mirrored risk attitudes for gains and for losses; and to *loss aversion*, predicting that people display a disproportionate dislike for losses.

This article provides a critical assessment of the way in which prospect theory has been applied in the literature on political decision making to date. In particular, it builds on existing reviews of prospect theory applications and political science, and especially focus on highlighting methodological challenges and shortcomings in the existing literature. The insights derived are twofold. One, some aspects, such as the reflection effect, have received considerably more attention than others, such as loss aversion or likelihood dependence. Two, there is a twin challenge arising from the combination of this selective modelling and *ex post* rationalization. The article ends by proposing a step-wise procedure that may help making modelling approaches more systematic, and that could help to also predict future decision making behavior.

Keywords: prospect theory; loss aversion; probability weighting; political decision making

Introduction

Rational theories of choice offer a useful normative yardstick for decision making under risk and uncertainty in politics and elsewhere.¹ However, the descriptive accuracy of such theories—their ability to account for the decisions under uncertainty we actually observe—has been shown to fall short of the mark in a long string of findings (Allais, 1953; Ellsberg, 1961; Green & Shapiro, 1994; Schoemaker, 1982; Vickrey, 1945). Although solutions to some of the shortcomings had been proposed here and there before (Markowitz, 1952; Preston & Baratta, 1948), it was only with Kahneman and Tversky's (1979) article on prospect theory that these solutions were organized into a coherent modelling framework, thus revolutionizing the way in which economists and political scientists thought about decision making under uncertainty.² Since the lion share of decisions by political actors take place under such conditions, it is not surprising that prospect theory has been applied in numerous analyses of political decision making (see e.g., Boettcher III, 2004; Levy, 1992, 1997; Jervis, 1994; Shaif, 1994; McDermott, 2004; Mercer, 2005; Vis, 2011; Stein, 2017 for reviews).

Prospect theory proposes a psychologically founded account of decision making under uncertainty, representing uncertainty preferences as a multi-faceted concept. The major conceptual insights on which the theory is based can be summarized by *reference-dependence* and *likelihood-dependence*. Reference-dependence entails that the utility people derive from a decision is defined over changes in outcomes rather than over absolute outcome levels. Likelihood-dependence captures the observation that people tend to distort probabilities non-linearly when making a decision. One of the main psychological intuitions underlying both these departures from expected utility theory is the principle of *decreasing sensitivity*. In terms of utility, decreasing sensitivity implies that a given change in outcomes receives less weight the farther it falls from a reference outcome, resulting in concave utility for gains and convex utility for losses. In terms of probabilities, decreasing sensitivity entails that a given change in probabilities receives much more weight when it falls close to the probability endpoints of 0 and 1 than when it falls into intermediate probability ranges.

The second major psychological principle is *loss aversion*—the insight that people tend to weigh a given loss considerably more heavily than an equivalent gain (Tversky & Kahneman, 1991). The upshot of all of this is that risk preferences for a given situation may depend on a variety of factors,

¹ The term *uncertainty* is typically used in cases where the exact probabilities are unknown, while the term *risk* is used for the less realistic case in which probabilities are objectively given. We will henceforth use the term *uncertainty*, and take *risk* to be a special case of *uncertainty*.

² The original formulation of prospect theory had some problems and limitations. By incorporating the idea of rank-dependence (Quiggin, 1982), Tversky and Kahneman (1992) made the theory mathematically consistent, and expanded its applicability from the case of risk (known probabilities) to uncertainty (unknown probabilities); see Wakker (2010) for details of the differences.

including (1) whether the situation is construed as a pure gain, pure loss, or mixed (gain and loss) outcome situation; (2) the importance of the stakes involved; and (3) the subjective probability attached to the different outcomes. This will often result in complex modelling issues that need to be addressed carefully and in a principled way before making predictions about how somebody may decide in a given situation. This does not only make the discourse when applying prospect theory rather complex, it also makes it necessary to clearly articulate the kind of prospect or probability distribution underlying the decision—something that is rarely done in practice (for exceptions, see e.g., McDermott, 1998; Haas, 2001). This issue is further complicated by the fact that the representation of such prospects is often subjective (cf. Jervis, 1994: 38-39; Shafir, 1994: 155).

As shown below, some stylized facts underlying prospect theory have captured the imagination of political scientists more than others. Foremost amongst these is the *framing* or *reflection effect*—the stylized finding that people tend to be risk averse for gains, and risk seeking for losses (Tversky & Kahneman, 1981). While reference-dependence, which underlies the framing effect, is certainly one of the central elements of prospect theory, economists have especially emphasized its other consequence—*loss aversion* (Levi & Whyte, 1997 is an example of a study in political decision making focusing on loss aversion). The importance of loss aversion can be traced to the observation that almost all real world decisions entail some gains and some losses, and that risk aversion over small-stake decisions is difficult to conceptualize if not through loss aversion (Rabin & Thaler, 2001). Beyond issues of their relative merit, loss aversion and the framing effect often continue to be treated jointly and even confused in applied papers (e.g., Tezcur, 2016), resulting in issues of identification and lack of conceptual clarity.³

This article builds on the ongoing discussion of how to address the challenges in applying prospect theory to political decisions (see e.g., Boettcher III, 2004; Levy, 1992, 1997; McDermott, 2004; Mercer, 2005; Shafir, 1994 for reviews and discussions) by concentrating on the *methodological* challenges of applying prospect theory to political decision making. Our focus on methodological challenges makes this article especially relevant for those readers who already have some background in prospect theory. To also accommodate those readers who are novices in this area, prospect theory and expected utility theory are contrasted briefly in the section ‘First, choose your reference point’. Such readers are also advised to first read one of the older reviews cited above (Mercer, 2005 is a good starting point). This article concentrates on two methodological challenges in particular. The first concerns the degree to which existing studies have focused on specific aspects of prospect theory rather than applied the full conceptual apparatus. The second aim consists

³ For instance, Tezcur’s (2016: 249, emphasis added) claim that ‘if individuals perceive themselves operating in the domain of losses, they *develop* loss aversion’ is simply incorrect. If they indeed purely operate in the loss domain, then loss aversion is simply not identified and can thus have no influence on decisions.

in assessing whether the literature has tried to maximize the *ex post* fit to the data to the detriment of clean *ex ante* predictions. While the latter is a general problem in the social sciences, it seems particularly pertinent for applications of prospect theory, where the multiple parameters of the model afford endless possibilities to maximize data fitting, which may not contribute to our ability to truly *predict* decision making under uncertainty. Our aim with this discussion is to reveal the current methodological weak spots in prospect-theoretical-applications to political decision making and to indicate some constructive ways forward.

Prospect Theory for Decisions under Uncertainty

Different from existing reviews of prospect theory in political science (see references in the section ‘Introduction’), this article tries to directly describe the type of uncertainty attitudes we might expect to encounter conditional on the decision situation.⁴ Each of the sections to follow starts by discussing the general issue at hand, drawing mostly on literature from economics and psychology. Subsequently, we indicate how this general notion is taken up—or not taken up—in prospect-theoretical applications on political decision making.

It is beyond the scope of this article to provide a comprehensive assessment of all relevant studies in political science. Instead, we start by conducting a review of a selection of prospect-theoretical applications or reviews that were published from 2004 onwards, that is the last year in which comprehensive reviews of prospect-theoretical applications in political decision making appeared (Boettcher III, 2004; McDermott, 2004). The articles were selected in four steps:

Step 1: In May 2018, we conducted a Web of Science cited author search of ‘Kahneman, 1979’, looking up only citations of the Kahneman and Tversky 1979 piece in *Econometrica* and allowing for typos in the journal’s title of different styles. Only citations from the Social Science Citation Index (SSCI) were included. This yielded 11,612 articles in total.

Step 2.: Of those 11,612 articles, we selected those from the Web of Science categories ‘Political Science’ [n=529] and ‘International Relations’ [n=175].

Step 3.: Next, all articles from the top-20% of the SSCI of each category were selected. Online Appendix A1 gives an overview of these journals. Although this selection is, of course, somewhat arbitrary, it should allow us to pick up well-cited journals in the field. Moreover, about half of the 593 articles from Step 2, namely 247, appeared in this top-20%.

Step 4.: Of these 247, we close-read those articles with prospect theory and/or loss aversion in the title and/or abstract. There were 21 articles that met this criterion (18 applications; 3 review articles).

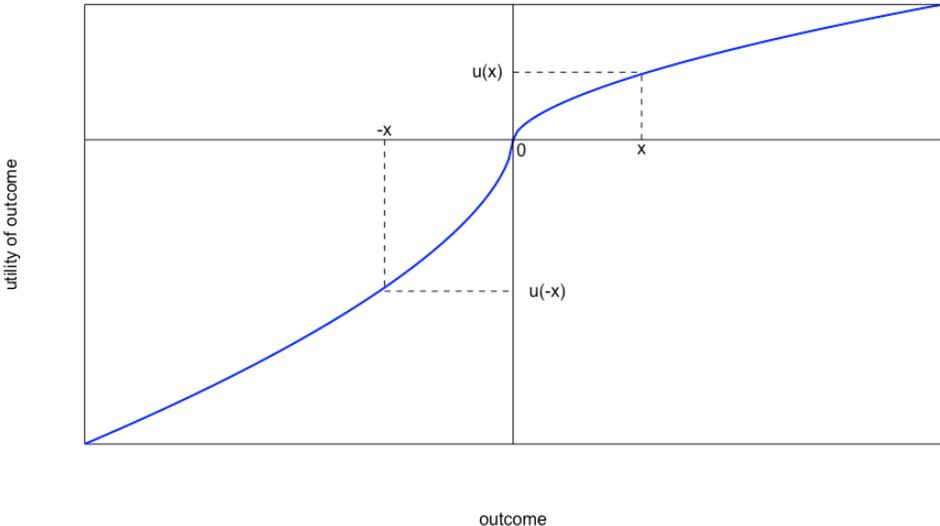
⁴ Note that the difficulty at least partly arises from the fact that researchers want to move beyond descriptive fit or what could be labeled “post-dictions” instead of predictions. If a reader is interested in post-dictions, he or she can substitute “opportunity” for every occurrence of the word “challenge” in the text to follow.

In addition to these 21 articles, we also included some additional studies that do not meet the selection criteria set forth above, but that are either an example to follow (e.g., McDermott, 1998), book length contributions (e.g., Berejikian, 2004; Weyland, 1996), or that in some other respect constitute interesting illustrations of a point this article is making. It is thus not our aim to be comprehensive here, but to use relatively recent or relevant studies to illustrate the arguments.

First, choose your reference point

The first step in predicting whether a decision maker may be uncertainty averse or uncertainty seeking in a given situation is to determine whether the situation is best conceived of as one over pure gains, one over pure losses, or as a mixed decision involving both gains and losses. Figure 1 illustrates this point by showing prospect theory’s reference-dependent utility function. Other than under expected utility theory, where preferences are defined over total wealth, preferences in prospect theory are defined over changes in wealth from a reference point (indicated at 0 in the figure). This results in decreasing sensitivity over such changes, as captured by the concave pattern of the utility for gains and the convex patterns of the utility for losses—a given change in wealth matters relatively less the farther away from the reference point it falls. Loss aversion is indicated by the kink in the utility function at the origin—a given loss looms larger than an equivalent gain. This also means that loss aversion can only be identified using mixed prospects involving both gains and losses, and is thus inconsequential for decisions that involve only losses and for the reflection effect, which captures regularities in decision patterns for pure gains and pure losses.

Figure 1: Prospect theory’s reference-dependent utility function



Alas, the determination of the reference point is also one of the most difficult steps. As Mercer (2005: 4) correctly notes, ‘political scientists all wrestle with the problem of determining an actor’s or group’s frame. The obstacles are formidable and the temptation to reason backwards, from choice to domain to frame, are strong’. Kahneman and Tversky (1979) identified the current situation or status quo as the reference point, as do many applications in political decision making (e.g., Levi & Whyte, 1997; Vis, 2010). Subsequent studies have shown evidence for a wide variety of alternative reference points, such as buying prices of houses or financial assets (Odean, 1998), or aspiration levels (for instance, Taliaferro, 2004b, used political leaders’ aspiration levels such as their territorial aspirations), or even stochastic reference points that require comparisons of outcomes contingent on the state of the world before any uncertainty is resolved (Schmidt, Starmer, & Sugden, 2008; Sugden, 2003; see e.g., Mercer, 2005 for a discussion of different types of reference points in political decision making).

Even if one were to settle on the status quo as the reference point, this does not immediately solve the issue. In a dynamic setting, one would still need to determine the speed with which the reference point adjusts to changes in outcomes. While the explanation of some phenomena requires reference points to adjust very quickly and people to be myopic (see e.g. explanations of the equity premium puzzle in economics: Gneezy & Potters, 1997; Mehra & Prescott, 1985), other phenomena require people to adjust their reference point rather slowly (such as e.g. the disposition effect; see Odean, 1998). Schumacher, Van de Wardt, Vis and Baggesen Klitgaard (2015) is an example of a study of political decision making in which the reference point—there called the aspiration level (cf. Bendor, Diermeier, Siegel, & Ting, 2011)—changes dynamically. In Schumacher et al.’s study on party platform change, the aspiration level adapts dynamically, being adjusted upward if performance exceeds the aspiration level and adjusted downwards if it is below it. Specifically, Schumacher et al. (2015: p. 1044) ‘propose that a party’s office aspiration adjusts dynamically, whereby failure (i.e., being in opposition) motivates a party to lower its expectation of office and success (i.e., being in government) increases its office aspiration’.

An example of how to deal with the problem of empirically establishing the reference point is Sheaffer and Shenhav’s (2013) study on congruence between democratic values among the public, a country’s institutions, and political stability. As they state:

Although not referring to prospect theory and to the reference point, we believe that the empirical approach taken by Inglehart and Welzel (2005, 186-91) and presented earlier, is an acceptable solution. As discussed earlier, they measured the difference between the supply of freedom (the country’s level of democracy) and the demand for freedom (the level of democratic values held by the people). Applying this empirical solution, the reference point is where demand and supply are equal (p. 238).

Different assumptions on how quickly the reference point adjusts—such as for instance those underlying myopic loss aversion and the disposition effect mentioned earlier—must not necessarily result in contradictions if a specific process is determining these reference points. Some studies in economics have made a start at building formal models of reference point determination. These models typically rely on an old intuition—that reference points need to be somehow *salient* (e.g. Hershey & Schoemaker, 1985). Some 21st century studies in this field have taken a stab at formalizing this concept, which may also contribute to some aspects of likelihood-dependence (Bordalo, Gennaioli, & Shleifer, 2012). Other economic theories have tried to directly model the reference point formation process, coming up with a variety of different ‘equilibria’ (Kőszegi & Rabin, 2006, 2007). While promising, this literature is still somewhat too young to allow for definite conclusions. For one, it has at times proved difficult to determine *ex ante* which equilibrium should be applied in a given situation, bringing the problem back to square one. In addition, these theories often need to make simplifying assumptions to keep the problem tractable, which means that they entail a tradeoff between a formal account of reference-point formation and the generality of the underlying theory.⁵ These issues may well be fixable, but only time will tell whether this will indeed increase predictive performance.⁶

Yes, but what are the chances?

Once the reference point is fixed, one needs to determine what the chances of—or probabilities attached to—various outcomes are. Economists have often eschewed this question by studying artificial situations of *risk*, where all outcomes and probabilities are given and objectively known to the decision maker. When looking at real decisions in the real world, things tend to be more com-

⁵ For instance, the model proposed by Kőszegi and Rabin (2007) simplifies the setup adopted by treating probabilities linearly. This, in turn, means that the theory has difficulties accounting for the co-existence of gambling and insurance decisions—one of the main historical issues that have eventually led to the emergence of prospect theory.

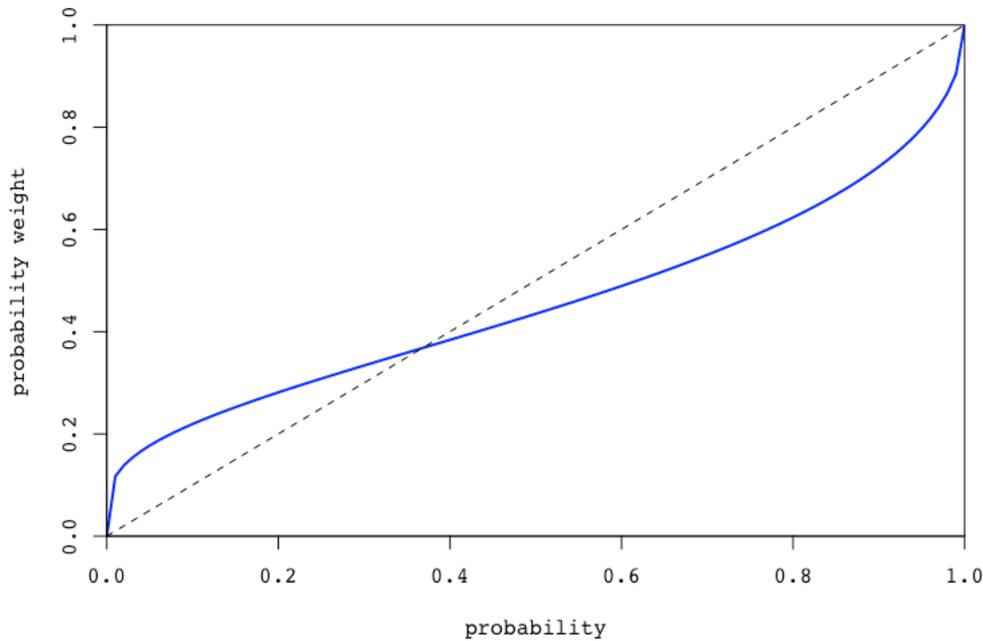
⁶ Baekgaard (2017: 938-939) made a somewhat related observation—which applies to prospect-theoretical applications more generally: ‘gain and loss domains are surprisingly ambiguous concepts in the literature. Usually, they are manipulated (...) indirect[ly, calling] into question whether findings reflect differences between gain and loss domains or rather the valence of the words used (...). A useful extension would therefore be to study whether the findings can be reproduced if gains and losses are manipulated differently than in the current experiments, for instance, by explicitly stating whether reform attempts are undertaken to avoid losses or increase gains’.

plex, since the subjective probabilities of a decision maker need to be determined before the decision situation can be described and predictions can be made.⁷ While such probabilities can in principle be measured or inferred from choices (e.g. Abdellaoui, Baillon, Placido, & Wakker, 2011), in practice this often proves tricky. Oftentimes scholars thus need to make assumptions on subjective probabilities, e.g. that they are equal to objective probabilities where the latter exist and can be quantified (Barseghyan, Molinari, O'Donoghue, & Teitelbaum, 2013). Even where copious data on the uncertainty generating process are available to decision makers, however, subjective probabilities may not be accurate. Overconfidence—the phenomenon whereby subjective probability ranges are on average too narrow relative to the true uncertainty surrounding the probabilities of a given situation—is a particularly thorny issue.

The reason why determining probabilities is so important can be found in likelihood-dependence, and particularly in the two main stylized facts emerging from it. One, people tend to attribute a very high weight to a change in probability from 0 (or impossibility) to a small probability—a phenomenon known as the *possibility effect*. Concomitantly, people tend to attribute much weight to changes of probabilities from very large values to certainty—a phenomenon known as the *certainty effect*. Taken together, this means that in intermediate probability ranges even relatively large changes have little impact on decisions. Figure 2 illustrates this point. Figure 2 depicts a typical probability weighting function as it has been found in aggregate data (e.g., Abdellaoui, 2000; L'Haridon & Vieider, 2018). The dashed diagonal line represents the case of linear probability treatment. The weighting function deviates from such a treatment in systematic ways. It shoots up for small probabilities, which are thus overweighed in decisions. This is the possibility effect. It again shoots up when moving from very large probabilities to certainty—the certainty effect. In intermediate regions, even relatively large changes in probabilities have little effect on decisions, a phenomenon known as *likelihood-insensitivity*.

⁷ Some scholars in psychology have taken a different, albeit equally artificial, approach, whereby people are required to sample from unknown distributions to get to know the probabilities before making a decision (Hertwig & Ortmann, 2001). While initial claims suggested that data in this paradigm fundamentally contradicted prospect theory, other scholars quickly showed that the alleged differences were due to sampling issues which resulted in discrepancies between the true and perceived probabilities. Taking this into account, prospect theory indeed performed rather well in accounting for the observed decision patterns (Fox & Hadar, 2006). This example further underlines the importance of getting the subjective probabilities right.

Figure 2: Probability weighting function



While often neglected in political science applications (see later in this section for an overview), probability distortions can be important in practice, especially in extreme situations where certainty may seem within reach. An important rationale for their introduction into the economics literature was that it is difficult to explain the coexistence of insurance and gambling without probability distortions.⁸

Political scientists have often used decreasing sensitivity in utility to model the reflection effect, resulting in risk aversion for gains and risk seeking for losses. The complete prospect theory setup however, makes it necessary to combine probability distortions with utility curvature to make inferences on expected risk attitudes. For gains, the probability weights depicted in figure 1 are attached to the best possible outcome. This means that for moderate to large probabilities, probability weighting will further reinforce risk aversion incorporated in the utility function. For small

⁸ This was an issue that plagued expected utility theory from the onset. Already Vickrey (1945) remarked that risky trade-offs could not be used in practice to measure utility curvature due to the distortions observed in insurance and gambling decisions. Friedman and Savage (1948) tried to salvage the expected utility paradigm by introducing ad hoc inflection points into the utility function, only to get severely criticized for it by Markowitz (1952). Markowitz's solution was to introduce reference-dependence into the utility function, combined with qualitatively different patterns for small and large stakes that could capture insurance and gambling decisions. The main issue with that implementation, however, is that it is difficult to reconcile with empirical observations showing the prevalence of insurance for small losses rather than large losses (Sydnor, 2010).

probabilities of gains, however, the two will pull in opposite directions. It is then a question of the relative strength of utility curvature and probability weighting whether we may observe risk aversion or risk seeking (or indeed risk neutrality, if they cancel each other out completely). The answer will in part depend on the size of the outcome, and on the strength of decreasing sensitivity. Experiments with monetary outcomes tend to indicate that especially for very small probabilities, probability weighting tends to overpower utility curvature up to at least (hypothetical) amounts of the order of 100,000 Euros for private individuals (Bouchouicha & Vieider, 2017; Fehr-Duda, Bruhin, Epper, & Schubert, 2010; Scholten & Read, 2014). A similar yet mirrored story holds for losses. Here the stylized fact most often encountered in the political science literature is one of risk seeking. Probability weights are now, however, applied to the worst possible outcome. This means that for moderate to large probabilities of the loss, probability weighting will indeed reinforce risk taking for losses. If the likelihood attached to large losses is small, however, that may well result in risk aversion for losses—the very insurance motive discussed above. Whether it does indeed result in risk aversion in practice will again depend on the relative importance of decreasing sensitivity in utility and the overweighting of small probabilities.

When examining existing reviews of prospect theory and applications in the literature on political decision making with an eye to the notion of probability weighting, three things stand out: (1) Many researchers in political science and international relations are aware of the centrality of probability weighting in prospect theory; (2) In prospect-theoretical applications, probability weighting is usually ignored (cf. Neilson, 2003: 171); and (3) this ignoring of probability weighting seems to occur more and more as the time passes since the first applications in political decision making in the early 1990s. Let us elaborate these points some more.

Many studies in political decision making that apply prospect theory do not mention probability weighting at all (Berejikian, 2004; Bhatti et al., 2018; De Vries, 2018; Fuhrmann & Early, 2008; He & Feng, 2012; Jervis, 1994; Johnson, Myagkov, & Orbell, 2013; McDermott, 1992; Morrissette, 2010; Sheafer & Shenhav, 2013; Tezcur, 2016; Trampusch, 2014; Van de Wardt, 2015; Vis, 2009, 2010; Vis & Van Kersbergen, 2007).⁹ Then there are studies that do mention probability weighting, but indicate that they ignore it (e.g., Levi & Whyte, 1997; Weyland, 2002; McDermott, Fowler, & Smirnov, 2008). Weyland (2002: 38, note 3), for instance, states that ‘for reasons of simplicity and clarity, this study draws only on the central finding of prospect theory and does not consider other

⁹ Note that in De Vries (2018), prospect theory is not the main theory to be applied, but insights from prospect theory are used to explain that voters with a negative European Union (EU) differential—the difference between the evaluation of the EU-status quo and an EU-alternative state—are in a frame of loss and therefore risk seeking (i.e., willing to change the status quo), while those with a positive EU differential are in a gains domain and hence risk averse (i.e., unwilling to change the status quo).

interesting results concerning the way in which people frame decision options and subjectively weigh the probabilities of these scenario's occurrence'. McDermott et al.'s (2008) article on the evolutionary origins of prospect theory preferences concentrates on the two-fold pattern of risk seeking in the domain of losses and risk aversion in the domain of gains. Still, before introducing their model based on optimal foraging theory, McDermott et al. (2008) also amply discuss the probability weighting function. And they come back to the latter when discussing the implications of prospect theory for extant political models, in particular American spatial voting models (p. 344).

Quite some studies do mention probability weighting, sometimes in a footnote, but do not include it in the analysis itself (e.g., Baekgaard, 2017; Elms, 2008; Haerem et al., 2011). Elms (2008), for instance, concentrates on framing and loss aversion in her re-reading of existing studies in International Political Economy through a behavioural economics lens. Similarly, Haerem et al. (2011) discuss the four-fold pattern of risk attitudes, but do not incorporate this in their analysis of whether military decision makers behave in line with prospect theory. Baekgaard (2017), moreover, conducts three experiments (one with Danish citizens and two with MTurkers from the US) to examine whether prospect theory applies to public sector reforms. Baekgaard (2017) discusses probability weighting, but formulates hypotheses only on risk aversion and the reflection effect.

Interestingly, many review articles do actually discuss probability weighting. For example, Levy (1994) indicates that international relation scholars should take into account that risk propensities are different from the [in our words] two-fold pattern when probabilities are small or very small. This is especially important, but not exclusively so, in the case of foreign policy decision making—think of the probability of a nuclear war, but also conflict more generally, both of which are small-probability events with huge consequences. Levy (1994: 14) rightly indicates that this means

that analysts who apply prospect theory need to be quite sensitive to the probabilities which decision-makers attach to various outcomes. If probabilities are in the moderate range, the standard prospect theory hypotheses based on the value function can be applied. But if probabilities are small, one cannot apply these hypotheses directly without making assumptions about the respective shapes of the value and probability-weighting functions. The analyst's task is complicated further by uncertainty regarding the transition point from over-weighting to under-weighting of probabilities, particularly for the more complex choice problems typically found in international relations.

Other examples of reviews mentioning probability weighting are Shafir (1994) and Stein (2017).

McDermott (1998) is one of the few studies in which probability weighting is not only extensively discussed (pp. 29-24, 192-193 & note 56), but also applied empirically. In her case study of the 1956-Suez crisis (pp. 154-155), McDermott explains that European leaders—who assumed that

the probability that Nassar would take over large parts of the Middle East was (very) high—under-weighted this likelihood, making them willing to turn to force. The American president Eisenhower assessed this risk to be low, conversely, which explains why he rather chose diplomatic options. Another study in which probability weighting is included explicitly in the empirical analysis is Haas's (2001) study of the Cuba Missile crisis. The probability assessments in Haas's study are qualitative in nature (very high, low, et cetera), based on the available primary and secondary sources. Haas (2001: 266, emphasis in original) shows that '(...) when Kennedy and Khrushchev operated in the domain of losses and their probability estimates for the principal outcomes were in the moderate-to-high range, these leaders tended to be [uncertainty seeking]. When, however, their probability estimates for prominent outcomes approached certainty, they were much more cautious'. Also Schaub (2004), focusing on the different degrees of coercive effort involved in deterrence (less effort required), and compliance (more effort required) incorporates probability weighting. Schaub, for instance, states that 'when the deterrer's threat is very credible, it means that the chances of the adversary winning the gamble of defiance are low. But when the chances of winning the gamble are low (i.e. below .34), the adversary's tendency to prefer the sure bet of compliance will be attenuated' (2004: p. 401).¹⁰ Relatedly, Linde and Vis (2017) showed by means of an experiment with Dutch members of parliament as their main participants that politicians also display probability weighting, further showing the importance of accounting for such patterns.

The discussion above may create some confusion, since a clear solution is usually not easy to come by in cases where contradictions may arise from utility curvature versus probability weighting. At the very least, however, awareness of the issue ought to make it possible to determine the robustness of one's inferences to ranges of subjective probabilities. Conceivably, there may be an even bigger issue threatening applications of prospect theory to political decision making. Once again, the main stylized fact that has been used consists in a uniformly concave utility function for gains, and a convex function for losses (generally combined, at least implicitly, with linear probability weights). However, outcomes in political decision making are seldom continuous, unlike the monetary outcomes for which these utility functions have been derived and estimated. Winning an election or not is a 0-1 outcome that may well render the very notion of decreasing sensitivity in utility meaningless. We will shortly discuss different ways of modelling such situations, which may be more suitable in many situations faced by political scientists. First, however, we need to tackle another major stylized fact of prospect theory—loss aversion.

Whatever you do, do not lose

¹⁰ Other studies that also discuss probability weighting are Taliaferro (2004) and Farnham (1992).

Reference-dependence is arguably the most frequently used stylized prospect theory fact in political science and international relations. One of its consequences—the reflection of attitudes from risk averse to risk seeking, also known as the ‘framing effect’—has received more attention in political science than the other, loss aversion. However, whenever a prospect entails both potential gains and potential losses, loss aversion is likely to apply to the losses, making people shy away from the prospect. With an often-cited figure of losses looming about twice as large as gains (Akalis, 2008; Horowitz & McConnell, 2002), loss aversion can indeed be a strong force counteracting risky undertakings. While there is some disagreement as to whether specific situations should be modelled as taking place over mixed gain-loss prospects or over pure gains or losses (Bateman, Kahneman, Munro, Starmer, & Sugden, 2005; Sydnor, 2010), the great majority of real world decisions is best construed as being over mixed prospects. Furthermore, most of the risk aversion we observe—especially in decisions involving relatively small stakes—is likely driven by loss aversion (Köbberling & Wakker, 2005; Markowitz, 1952; Rabin, 2000; Samuelson, 1963).

Such loss aversion could, for instance, easily lead to inaction on the part of governments. Let us consider a head of government who wants to implement a series of policy reforms. Some of them may be controversial with either the parliamentary majority backing the government and/or the electorate. This may well lead to inaction if loss aversion is applied to potential bad outcomes or vested interests threatened by the reform—something that has been termed the status quo bias (Kahneman, Knetsch, & Thaler, 1991). Assume that a given reform is likely to go through and to be successful, but that it also has a small likelihood of failing, including the potential to topple the government if a rebel faction in parliament gets its way. Even if the likelihood of such a negative outcome is small, the disutility induced by loss aversion—potentially further enhanced by the overweighting of the small probability attached to the loss—may well make the government shy away from the reform. There is also another sense in which loss aversion may frustrate reform efforts. To the extent that people are loss averse, policies that do not result in Pareto improvements—i.e. where some people are better off while nobody is worse off—can be expected to meet strong resistance from the public. This is because people who stand to lose will put up much more resistance than people who stand to gain will be supportive. Such asymmetries may contribute to difficulties in reforming advanced democracies (see e.g., Pierson, 1994; Van Kersbergen & Vis, 2014), as we witness them very frequently.

This does not mean that loss aversion must always overpower all other motives. Let us imagine the following scenario. A country wants to annex a disputed territory, on which a neighbor does also lay a claim. It has found a clever way of doing so, and goes ahead with the annexation. What do we conclude from that? Based only on framing effects, one could conclude that the country found itself somehow “in a loss frame”, having adopted the expanded territory as a reference

point, so that there are no gain outcomes and loss aversion does not bite. This seems overly creative in terms of reference-point engineering. Instead, we would be better off by trying to assess the situation in more detail. What is the likelihood that the aggressor will get away with the annexation, and what is the benefit attached to that outcome? What is the likelihood of a bad outcome, and what form will that outcome take? Some bad outcomes, such as temporary sanctions, may well be judged to be small, and carry little disutility. Probabilities attached to truly bad outcomes carrying large disutility, such as open war, may be judged to be small or negligible. In all these cases loss aversion may not be strong enough to tip the balance.

There are studies in political decision making that explicitly focus on loss aversion. Berejikian and Early (2013), for example, concentrate on loss aversion instead of prospect theory as a whole to account for how hard American policy makers fight to win trade disputes. Instead of adopting ‘all of the assumptions and attendant complexities of prospect theory to invoke the insights provided by loss aversion’, Berejikian and Early draw on ‘the more narrowly focused neuroscientific research agenda on loss aversion’, since that according to them ‘provides a more detailed, nuanced understanding of how loss aversion affects human decision making than prospect theory does’ (2013: 651-652). By drawing on the neuroscientific agenda, Berejikian and Early (2013: 652-653) indicate that gains are processed in the brains’ “reward system”, the system that is activated also in the case of for example food consumption or when receiving financial rewards. The brain, conversely, processes losses in an “aversion system” related to strong negative emotions, such as pain or disgust. The response to losses in the brain is stronger than is the response to gains. Berejikian and Early (2013: 654) argue that ‘because loss aversion shapes the resources and risks that decision makers are willing to undertake to achieve their objectives, (...) this will also affect the resolve that political leaders demonstrate when they confront foreign policy conflicts’. They then move on to defining preventive policies, that is policies that are ‘primarily driven by the desire to mitigate an erosion of current assets’ (p. 654), such as protecting existing territorial holdings or preventing the loss of alliance partners. In other studies, loss aversion seems relevant but is not mentioned. Bhatti, Dahlgard, Hansen and Hansen (2018), for instance, examine by means of a field experiment in which letters were sent to >60,000 potential first-time Danish voters whether Go Out to Vote Campaigns are effective. They hypothesize that those letters framed as losses should have the largest effect (they found no difference between the letters framed as gains and those as losses). Interestingly, while this hypothesis clearly comes from loss aversion, the authors do not mention it.

And what if I simply don’t care?

We have assumed thus far that all outcomes of a decision situation are about equally important. This may not be realistic. Incentives may create salient outcomes—for instance by attributing different importance to outcomes depending on whether they just achieve a target, or just fall short of it. Such situations are often modelled by shifts in reference points, keeping the rest of the functional apparatus of prospect theory intact. This is clearly an assumption—and a questionable one to boot.

Imagine that a political party lags behind in the polls to win an election, and considers a risky strategy providing a small (subjective) probability of over-taking the other party or of gaining an absolute majority, and a large probability of losing votes. Implicitly, this type of setup thus assumes a reference point fixed at $50\%+1$ vote/seats (for the absolute majority), or of $q+1\%$ if the second party receives a share of $q\%$ of the vote.¹¹ The combination of the overweighting of the small probability of winning the election—resulting in risk seeking for gains—and the underweighting of the large probability of losing the election—resulting in risk seeking for losses—may just be able to explain such behaviour. However, the prospect remains mixed, and unrealistically extreme parameters may be needed for the uncertainty seeking tendencies arising from probability weighting to overcome loss aversion—even once we abstract from the consideration that decision makers are supposed to be risk averse for large gains due to diminishing sensitivity in utility. Even this very stylized example thus seems to call at the very least for a numerical calibration exercise, which will require some explicit modelling of all the decision elements involved.

The issue is that it is far from clear whether a straight application of prospect theory as outlined above is a good way of modelling the situation. Some guidance may be found in applications of prospect theory to organizational behavior and management (March & Shapira, 1997). If any outcome below 50% of the vote does really not matter at all, one may indeed want to neglect that part, modelling the decision as one over small probability gains alone and neglecting the losses entirely (see e.g. Lefebvre & Vieider, 2014, for such a model involving compensation of company CEOs through stock options). Loss aversion then no longer applies, and we can explain the behaviour with risk seeking for small probability gains. Most of the political science literature, on the other hand, may have thought of this situation as one of risk seeking for losses—where the “loss situation” is given by having fallen behind in the polls, and implicitly modelled through convex utility for losses. We consider our explanation more plausible. While the supposed reference point does not differ across the two situations, our explanation explicitly does away with loss aversion

¹¹ As usual, this entails a stark simplification. One could of course also use a model in which the status quo is the reference point, and different probabilities are attached to different amounts of vote gains, with a small probability of a very large vote gain. The important thing is to capture the main behavioural driver, however, which is why this particular example is adopted here.

which would otherwise be problematic.¹² We also do not need decreasing sensitivity in utility, which is unlikely to be realistic in this scenario. Notice also that we did not achieve this by manipulating preference parameters, but rather by carefully considering the incentives faced by the decision maker.

The example just discussed is highly stylized, with only a binary outcome that matters—win or lose the election. More plausibly, the extent of the loss will matter at least to some degree, for instance because it may determine whether a party enters parliament at all in the presence of minimum vote thresholds, or whether it keeps open the window to participate in government as a junior partner, or whether it gets to lead the opposition block. This indeed raises the scenario of several coexisting reference points—a scenario that traditional prospect-theoretical models are ill-equipped to handle, and which render simple divisions into “gains” and “losses” impractical. Nevertheless, such complex scenarios can be organized using principled discussions based on qualitative prospect theory patterns, just as presented above for the simplest case. The danger, of course, lies in the fact that such multiple reference points provide even more flexibility in *ex post* data fitting. It thus becomes even more important to make *ex ante* predictions, and to test those on the data.

Your preferences or my preferences?

Absent specific data on the decision-maker, one must by necessity recur to so-called *strong* versions of the theory. That is, in addition to a reference-dependent utility function and the nonlinear weighting of probabilities applied to subjective probability representations, one needs to concomitantly adopt “typical” parameter values, or at least general qualitative patterns. This can be problematic. For one, the appropriate parameters may change depending on the subject population or context. Aggregate patterns have been found to be at least qualitatively stable across studies, albeit with more or less systematic quantitative differences across contexts that are still poorly understood. For instance, l’Haridon and Vieider (2018) document systematic differences in preference patterns across countries, with richer countries found to be less risk tolerant, more sensitive towards probabilities, and less loss averse than poor countries. In addition, individual decision makers may swerve significantly from aggregate values (see e.g., Haerem, Kuvaas, Bakken, & Karlsen, 2011 for a discussion), thus casting doubt on the validity of using average or median parameter values for inferences on the decision-making processes of individuals. To provide but one example, the

¹² To some extent, the different modelling approaches are interchangeable. Indeed, ignoring the loss outcomes beyond a certain point completely corresponds to adopting a utility function for losses that has no sensitivity for losses beyond that point. If one wants to adopt typical parameter values estimated in the prospect theory literature, however, such an approach would not work.

popular reflection effect resulting in the four-fold pattern of risk preferences has received very little support at the individual level (Cohen, Jaffray, & Said, 1987; Schoemaker, 1990).

This also raises the question whether politicians are like other people, and hence how accurate predictions based on average parameters, often obtained with students, may be. The evidence to date is still scarce, but there is 21st century experimental evidence showing that also politicians display the reflection effect (e.g., Linde & Vis, 2017; Sheffer, Loewen, Soroka, Walgrave, & Shaefer, 2017; Stolwijk & Vis, 2018) and suggestive evidence for probability weighting by politicians (Linde & Vis, 2017). At the same time, there are also indications that politicians' decision making may differ from that of other people. Politicians may for example be even less probabilistically sensitive than the general population, for instance because the large stakes over which decisions take place make probability differences less salient (Bouchouicha & Vieider, 2017; Fehr-Duda et al., 2010), and based on evidence that likelihood insensitivity is generally increased in decisions for others (Pahlke, Strasser, & Vieider, 2015; Vieider, Villegas-Palacio, Martinsson, & Majia, 2016). Some evidence also exists to the point that political experts—who are typically not politicians themselves—are less accurate forecasters of political events than are lay persons (Tetlock, 2005). More evidence on this point seems desirable.

Discussion and conclusion: Ways forward

The clearest insight resulting from our critical assessment of the literature is arguably just how challenging it is to apply prospect theory to political decision making. For one, the decision contexts tend to be extremely complex, and simplifications of such contexts—although possible and even necessary—are never innocuous. The highly subjective nature of evaluations of a given situation makes it necessary to speculate about the decision maker's view of the situation, including potential reference points, the utility of different outcomes, and the subjective probabilities attached to such outcomes. The flipside of such challenges is that it is also too easy to account for observed behavior—*any* observed behavior—through prospect theory, given the many free parameters. A principled and disciplined approach is thus essential if this literature is to move forward and to converge to some accepted conclusions, instead of what may read as *ad hoc* explanations for handfuls of situations.

Such challenges are in no ways unique to political science, and have also been encountered in economics and in psychology. One promising solution that is being tried in economics—admittedly amidst much resistance from some scholars and in a not entirely consistent way—is to pre-register hypotheses and analysis plans. Once again, such pre-registration would likely look very different in political science, since the analysis to be carried out may also often take very different

forms. Nonetheless, there may be some benefits to be had. For instance, one could try and take the following steps:

Step 1. Create a stylized *ex ante* ‘model’, which can be discursive and qualitative in nature. It should

- a) discuss the reference point(s) in the given situation;
- b) the subjective probability (ranges) of the most important outcomes; and
- c) the prospect theory parameters that may be relevant, and why they would be expected to result in risk seeking or risk aversion, or why the outcome may be ambiguous. Pre-registration seems desirable to make the process as transparent as possible. Note that the measurement of the reference point(s)—that is, a) in Step 1—can be done both deductive (by means of external standards, for instance), or inductively (for instance, by means of in-depth case studies). In the latter situation, to limit the risk of *ex post* fitting, it is key to discuss in advance the process through which the reference point(s) are to be determined. The same holds for the subjective probability (ranges) of the most important outcomes, that is b) in Step 1. The methodology and decision criteria underlying the analysis of a more explorative research endeavor can be explicitly stated in the pre-registration document and in the resulting work, which again makes the process fully transparent.

Step 2. Take the model to the data, and determine whether it can account for the observed behaviour. If it cannot, openly discuss how the modelling framework will have to change in order to accommodate the observed behaviour. Discuss the plausibility of the old versus new, amended, modelling assumptions, trying to be as objective as possible. Avoid attributing too much weight to the data—your original model may be right, and the situation at hand an outlier.

Step 3. If you accept the modifications produced by the data, incorporate them into your model, and make predictions for new data. Then start over.

This step-wise procedure is in no ways complete or exhaustive. The hope is that it could lead to a principled learning process, in which priors about given models of behavior can be updated in a systematic and principled fashion.

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Online Appendix A1: Overview of the top-20% journals based on the impact factor as used in the SSCI

For Political Science, the top-20% journals in the SSCI (May 2018, n=36) are: American Journal of Political Science, World Politics, Review of International Political Economy, International Organization, Political Analysis, British Journal of Political Science, American Political Science Review, Perspectives on Politics, Journal of European Public Policy, Public Administration, Journal of Conflict Resolution, Regulation & Governance, European Journal of Political Research, Annual Review of Political Science, Political Psychology, Socio-Economic Review, Governance, African Affairs, West European Politics, Comparative Political Studies, Political Communication, Review of International Organizations, Political Geography, Journal of Peace Research, Post-Soviet Affairs, JCMS-Journal of Common Market Studies, Philosophy & Public Affairs, Journal of Political Philosophy, International Theory, Policy Studies Journal, Political Behavior, Annals of the American Academy of Political and Social Science, Politics & Gender, South European Society and Politics, International Political Sociology, New Left Review.

For International Relations, the top-20% journals in the SSCI (May 2018, n=16) are: World Politics, Review of International Political Economy, International Organization, International Security, Journal of Conflict Resolution, Security Dialogue, Foreign Affairs, Review of International Organizations, Common Market Law Review, Journal of Peace Research, European Journal of International Relations, JCMS-Journal of Common Market Studies, International Theory, International Political Sociology, International Affairs, American Journal of International Law. For International Relations, we added two more journals, which are known for PT-applications: Foreign Policy Analysis, and International Studies Quarterly. Also note that many journals of the International Relations top-20% are also in the Political Science top-20%.