Luc Bovens

Evaluating risky prospects: the distribution view

Article (Accepted version) (Refereed)

Original citation:
Bovens, Luc (2014) *Evaluating risky prospects: the distribution view.* Analysis, 75 (2). pp. 243-253. ISSN 0003-2638

DOI: 10.1093/analys/anv023

Evaluating risky prospects: the Distribution View

LUC BOVENS

Analysis (2015)

Abstract. Risky prospects represent policies that impose different types of risks on multiple people. I present an example from food safety. A utilitarian following Harsanyi's Aggregation Theorem ranks such prospects according to their mean expected utility or the expectation of the social utility. Such a ranking is not sensitive to any of four types of distributional concerns. I develop a model that lets the policy analyst rank prospects relative to the distributional concerns that she considers fitting in the context at hand. I name this model 'the Distribution View' posing an alternative to Parfit's Priority View for risky prospects.

Keywords. The Priority View, Prioritarianism, Aggregation Theorem, Risk, Prospects, Harsanyi, Parfit

1. Introduction

A policy with risky outcomes can be modelled as a (risky) prospect. A prospect is a matrix of utilities. On the rows we list the people who are affected by the policy. In the columns we list alternative states of the world and we specify a probability distribution over the states. Each person faces a personal prospect on a policy, which is a row in the matrix.

A Policy Analyst (PA) may be sensitive to different types of distributional concerns in ranking prospects. To engage our intuitions I will present some examples from food safety. When we are considering regulation of raw food items (say, milk or eggs) it is important to note the distribution of risks in the unregulated prospect. Sometimes the risks are correlated: There is a small chance of an outbreak with mass casualties, but there is a good chance that there will be no public health problem. Sometimes there is much less of a (positive) correlation: There is a good chance that there will be isolated casualties, though only a small chance of an outbreak. Sometimes the risks are focused on, say, the elderly: We expect there to be casualties among the elderly, but others won't be affected.

Such distributional features of prospects play a role in deciding whether to adopt regulation and in deciding for what prospects regulation is more and less pressing. Regulation of these items is not cost-free—there are economic costs, there are health benefits of consuming the raw food, and there is just the sheer joy of tasting the raw food.

I will consider three idealised prospects which embody different risk distributions and a prospect which neutralises these risks. Utility values are chosen so that a utilitarian, following Harsanyi's aggregation theorem (1955), is indifferent between these prospects. However, if the PA is sensitive to distributional concerns, she will have at least some strict preferences over these prospects. The following questions arise: What distributional concerns determine these preferences? How can we measure these concerns? How is the weight of these concerns determined by the interpretation of the prospect? And how can we design a method for determining a ranking over real-life prospects?

I have named my approach "the Distribution View" in contrast to Parfit's Priority View (1997 and, as applied to risky prospects, 2012), which also favours the poorly off, but not on distributional grounds. Fleurbaey (2010) provides an overview of the literature and defends an evaluation of prospects in terms of the expectation of equally-distributed-equivalents. Other relevant literature includes Harsanyi (1955), Diamond (1967), Broome (1984a, 1984b, 1991), Keeney (1980), Rabinowicz (2001), Adler and Sanchirico (2006), McCarthy (2006, 2008), Otsuka and Voorhoeve (2009), Chew and Sagi (2011), Adler (2011), Bovens and Fleurbaey (2012), and Otsuka (2012). Comparisons are beyond the scope of this paper article but can be found in Bovens (2015).

2. *Regulating Correlated Risk, Anti-Correlated and Focused Risk*

In Table 1, there are four idealised prospects, viz. three unregulated prospects for food items that represent different risk distributions and the regulated prospect. There are three persons (rows) and three equiprobable states (columns). We will assume that there are only three utility levels, viz. the levels associated with remaining healthy while consuming the unregulated but uncontaminated food item (u = 1), with death resulting from consuming the unregulated contaminated food item (u = 0), and with consuming the regulated food item while remaining healthy but incurring the costs (u = 2/3). Utilities are measured on a ratio scale and the zero point represents the worst outcome that may actualise for the type of policy that is under consideration.

There are Correlated Risk (CR) and Focused Risk (FR) which we described in section 1. When there is no positive correlation, then risks are typically independent in the real world. However, Anti-Correlated Risk (ACR) brings out the same normative features of independent risk in our analysis and can be represented in a three-column matrix. And finally there is the case of Regulation (R).

<table>
<tr>
<td><table><tr><td>0</td><td>1</td><td>1</td></tr><tr><td>0</td><td>1</td><td>1</td></tr><tr><td>0</td><td>1</td><td>1</td></tr></table></td>
<td><table><tr><td>0</td><td>1</td><td>1</td></tr><tr><td>1</td><td>0</td><td>1</td></tr><tr><td>1</td><td>1</td><td>0</td></tr></table></td>
<td><table><tr><td>0</td><td>0</td><td>0</td></tr><tr><td>1</td><td>1</td><td>1</td></tr><tr><td>1</td><td>1</td><td>1</td></tr></table></td>
<td><table><tr><td>2/3</td><td>2/3</td><td>2/3</td></tr><tr><td>2/3</td><td>2/3</td><td>2/3</td></tr><tr><td>2/3</td><td>2/3</td><td>2/3</td></tr></table></td>
</tr>
<tr>
<td>Correlated Risk
(CR)</td>
<td>Anti-Correlated
Risk
(ACR)</td>
<td>Focused Risk
(FR)</td>
<td>Regulation
(R)</td>
</tr>
</table>

Table 1. Four prospects

We can calculate the value of a prospect on the ex ante route or on the ex post route. On the ex ante route we first calculate the value of each personal prospect on the rows and then calculate the value of the prospect on grounds of the values of the personal prospects. On the ex post route we first calculate the value of each state in the columns and then calculate the value of the prospect on grounds of the values of the states. ‘Ex post’ is a standard term in the literature which is somewhat ill chosen since an ex post evaluation is also conducted *before* the chance event happens. It is named ‘ex post’ because it evaluates the prospect from the perspective of the states that may actualise and not from the perspective of each person's individual prospect.

On the ex ante route, a utilitarian will calculate the average expected utility, which is 2/3 in all prospects. On the ex post route, she calculates the expectation of the average utility in each state, which, by simple algebra, is identical to the average expected utility. Hence, a utilitarian, who is not sensitive to distributional concerns, is indifferent between these prospects. However, a PA who is sensitive to distributional concerns will prefer Regulation to at least some of these unregulated prospects.

I will show, for each unregulated prospect, what kind of distributional concerns a PA may invoke to justify her preference for Regulation over the unregulated prospect.

1) Regulating Correlated Risk

   a) Ex ante. The PA prefers Regulation to Correlated Risk because she is sensitive to the risk that each person is facing. Granted, if the people in the prospect are expected utility maximisers then they are indifferent between their personal prospects on Correlated Risk and on Regulation. But the PA is unwilling to accept this risk on their behalf. We say that she is sensitive to the intra-personal-prospect distribution.

   b) Ex post. The PA prefers Regulation to Correlated Risk because she wishes to avoid the chance that a catastrophe will ensue in which all would die. She is sensitive to the inter-state distribution.

2) Regulating Anti-Correlated Risk

   a) Ex ante. Same as in 1a.

   b) Ex post. The PA prefers Regulation to Anti-Correlated Risk because she is sensitive to the unequal distribution within each state that may actualise. In each state, some people are very well off at the cost of other people (or, in our idealisation, of one person) who are (is) very poorly off. Everyone should be willing to shoulder some of the costs of regulation to avoid such an unequal distribution. She is sensitive to the intra-state distribution.

3) Regulating Focused Risk

a) Ex ante. The PA prefers Regulation to Focused Risk because she is sensitive to the unequal expectations that people are facing. She is sensitive to the inter-personal-prospect distribution.

b) Ex post. Same as in 2b.

Note that 3a and 3b are the same. In fact, there is no ex ante route that is distinct from the ex post route since Focused Risk is in effect a certain prospect—i.e. it does not affect anyone's utility what state of the world actualises. But it is worth making this conceptual distinction if we keep in mind that Focused Risk is a stylised case of a real world in which the risk is disproportionately focused on some people and not on others. Assuming that one person is bound to die is just an idealisation. In 3a the PA is sensitive to the fact that people face unequal expectations. In 3b she is sensitive to the unequal distribution in the many states that may actualise when risks are disproportionately focused.

The PA can justify her preference for Regulation in each case by pointing to an ex ante distributional feature and by pointing to an ex post distributional feature. On the ex ante route, these distributional features are either intra-personal-prospect or inter-personal-prospect. On the ex post route, these distributional features are either intra-state or inter-state. We summarise the concerns which the PA may invoke to justify her preference in Table 2.

	Ex ante	Ex post
Correlated Risk	Intra-personal-prospect	Inter-state
Anti-Correlated Risk	Intra-personal-prospect	Intra-state
Focused Risk	Inter-personal-prospect	Intra-state

Table 2. Distributional concerns prompting strict preferences for Regulation

3. *Modelling Distributional Concerns*

There are standard techniques in economic theory to model distributional concerns, for example in measuring risk aversion for gambles over monetary amounts or inequality aversion for monetary amounts allocated to multiple people. For risk aversion, we determine the certainty equivalent, i.e. the monetary amount which is such that one is indifferent between receiving this amount and participating in the actual gamble. For inequality aversion, we determine the equally distributed equivalent, i.e. the monetary amount which is such that one is indifferent between everyone receiving this amount or the actual allocation in question. (Atkinson 1970: 249–52 and, as applied to prospects, Fleurbaey 2010: 658).

Risk aversion can be measured by means of various one-parameter functions which yield the following certainty equivalents. For the parameter's infimum, the certainty equivalent is the expectation of the gamble (for risk neutrality); for its supremum, it is the lowest prize (for extreme risk aversion); and it is a monotonically decreasing function for intermediate values. For example, in an equiprobable chance distribution <State 1: \$16; State 2: \$4>, the certainty equivalent is $10 for the parameter's infimum, $4 for the parameter's supremum and a monotonically decreasing function for intermediate values.

Inequality aversion can be measured by means of the same one-parameter functions yielding equally distributed equivalents. Take an allocation <Person 1: $16; Person 2: $4>: For the parameter's infimum, the equally distributed equivalent is $10, i.e. the average amount allocated (for inequality neutrality); for its supremum, it is $4, i.e. the worst amount allocated (for extreme inequality aversion); and it is a monotonically decreasing function for intermediate values.

The parameter value measures sensitivity to a distribution—ranging from non-sensitivity for (risk or inequality) neutrality and maximum sensitivity for extreme (risk or neutrality) aversion.

For starters, it is sufficient to specify one such function with a particular parameter value (see section 6) representing moderate sensitivity to the distribution. This function squares the expectation of the square roots of the monetary values in the chance distribution or squares the average of the square roots of the monetary values in the allocation. For example, the certainty equivalent of the equiprobable distribution <State 1: $16; State 2: $4> equals $(1/2\sqrt{\$16} + 1/2\sqrt{\$4})^2 = \$9$. A person who is characterised by this function is mildly risk averse: She is willing to pay $9 for the gamble, i.e. slightly less than its expected value of $10. Similarly, the equally distributed equivalent of of the allocation <Person 1: $16; Person 2: $4> equals $((\sqrt{\$16}+\sqrt{\$4})/2)^2 = \$9$. A person who is characterised by this function is mildly inequality averse: She is indifferent between the actual allocation and an allocation in which all have \$9, i.e. slightly less than the average allocation of \$10.

We model the PA's sensitivity to the various distributional concerns by applying this function to the row utilities for the intra-personal-prospect distributional concern, to the column utilities for the intra-state distributional concern, to the expectations for the inter-personal-prospect distributional concern, and to the social utilities (i.e. the averages of the utilities in each state) for the inter-state distributional concern.

Let us show how this works for a PA who is comparing Correlated Risk and Regulation on the ex ante route with a concern for the intra-personal-prospect distribution. In Correlated Risk, the value of each individual prospect is $(1/3\sqrt{0} + 1/3\sqrt{1} + 1/3\sqrt{1})^2 = 4/9$. The value of the prospect is the average value of the individual prospects, i.e. 4/9. In Regulation, the value of each individual prospect is $(1/3\sqrt{2/3} + 1/3\sqrt{2/3}+ 1/3\sqrt{2/3})^2= 2/3$ and so the value of the prospect is 2/3. Hence the PA prefers Regulation, which has value 2/3, to Correlated Risk, which has value 4/9.

Similar calculations show that Regulation is preferred to Correlated Risk, to Anti-Correlated Risk and to Focused Risk, each time with one ex ante and one ex post concern pointing in the same direction. The evaluation of prospects will not always be this straightforward, as we will see in the next section.

4. Ordering Unregulated Prospects

Suppose that there are the three unregulated prospects in Table 1. The PA has decided that bringing in regulation for each prospect is advisable for distributional reasons, citing some of the reasons mentioned in section 2. But there is austerity and the government cannot afford regulating all prospects. What we need is an ordering over the unregulated prospects: Which one is worse, and hence more in need of regulation, and which one is not so bad, and hence less in need of regulation? Let us turn to pairwise comparisons.

4) Correlated Risk *vs* Anti-Correlated Risk

a) Ex post. The PA chooses to regulate Correlated Risk, since she finds Correlated Risk worse than Anti-Correlated Risk. The reason is that she wants to avoid the chance that there will be a catastrophe with everyone dying. She is sensitive to the inter-state distribution.

b) Ex post. The PA chooses to regulate Anti-Correlated Risk, since she finds Anti-Correlated Risk worse than Correlated Risk. The reason is that she is averse to the inequality that is present in any state that may actualise in Anti-Correlated Risk. She is sensitive to the intra-state distribution.

Is there a right answer? Much depends on how we interpret the prospect. If the worst outcome is death, the PA may be more sensitive to the inter-state distribution and be foremost concerned with avoiding the chance of catastrophe in Correlated Risk. If the worst outcome is that the people who fall ill are out of money, say, due to medical expenses, leading to huge inequalities, then the PA may be more sensitive to the intra-state distribution and be foremost concerned with such inequalities in Anti-Correlated Risk.

	Ex ante	Ex post
ACR ≻ CR		inter-state
CR ≻ ACR		intra-state

Table 3. Anti-Correlated Risk *vs*. Correlated Risk

5) Anti-Correlated Risk *vs* Focused Risk

(a) Ex ante. The PA chooses to regulate Focused Risk since she considers Focused Risk worse than Anti-Correlated Risk. She cares about the distribution of the expectations: All the risk should not be focused on one person. She is sensitive to the inter-personal-prospect distribution.

(b) Ex ante. The PA chooses to regulate Anti-Correlated Risk since she considers Anti-Correlated Risk worse than Focused Risk. She cares about the distribution within each person's personal prospect. In the case of Anti-Correlated Risk, everyone faces the risk of dying. In the case of Focused Risk, everyone has a certain prospect. The PA is sensitive to the intra-personal-prospect distribution.

Is there a right answer? In the context of food safety, 5b may strike us as so inhumane that it is outright ludicrous as a moral stand. Indeed, there is lack of risk in Focused Risk, but this lack of risk is beneficial for person 2 and 3 and it means certain death for person 1. So how could this be a good-making feature?

All depends on the interpretation of the prospect. Granted, in our food safety context, there is little to be said for focused risk. If there is bound to be risk, then it is better that the risk be spread than that it fall only on the elderly. But here are a few different interpretations.

Suppose that we need to decide between admission tests. The test selects the *i* top persons out of *n* applicants—in our example the single two top people out of three applicants. One test is highly reliable whereas the other leaves much to chance. If we construct the prospects relative to full knowledge of the skill set of the applicants, then the risk would be Focused Risk on the reliable test and Anti-Correlated Risk on the test that leaves much to chance. In this case the PA should clearly choose for the reliable test—i.e. Anti-Correlated Risk is worse than Focused Risk. (*Cf.* Broome 1984b: 55)

Here is a case with independent risk (bringing out the same normative features as Anti-Correlated Risk). Let there be an equal number of casualties from base-jumping and from urban cycling. The base-jumping casualties are focused on a few daredevils and the urban cycling casualties are spread among many commuters. The PA can invest in increasing either base-jumping safety or urban-cycling safety. It is reasonable to say that the base-jumpers carry a greater responsibility due to the higher risks they are assuming and society should not prioritise those who bring their bad luck upon themselves. Hence the PA should invest in increasing urban-cycling safety—i.e. independent risk is worse than Focused Risk.

	Ex ante	Ex post
ACR ≻ FR	inter-personal-prospect	
FR ≻ ACR	intra-personal-prospect	

Table 4. Anti-Correlated Risk *vs*. Focused Risk

6) Correlated Risk *vs* Focused Risk

(a) Ex ante. Same tension as in 5a and 5b.

(b) Ex post. Same tension as in 4a and 4b.

We can construct similar examples as in comparisons 4 and 5 to make these tensions plausible. For example, urban cyclists who have to cross a bridge that has structural problems and may collapse under the weight of rush-hour traffic face correlated risk. Again, it is reasonable to invest in bridge safety rather than base-jumping safety.

	Ex ante	Ex post
CR ≻ FR	inter-personal-prospect	intra-state
FR ≻ CR	intra-personal-prospect	inter-state

Table 5. Correlated Risk *vs*. Focused Risk

5. *Single-Concern Prospect Assessment*

We can now construct a simple model covering all prospects. The PA is only allowed to cite one distributional concern. In the problem at hand, she is concerned about (i) reducing outcome inequalities (ex post intra-state), (ii) avoiding catastrophes (ex post inter-state), (iii) reducing the risk facing individuals (ex ante intra-personal-prospect), or (iv) reducing unequal expectations (ex ante inter-personal-prospect). If she mentions an ex ante concern, we will do the requisite ex ante calculation, whereas if she mentions an ex post concern, we will do the requisite ex post calculation.

For example, suppose she says that she is concerned about reducing outcome inequalities. She is sensitive to the intra-state distribution which enters in on the ex post route. We can simply read off from tables 3, 4 and 5 that CR ≻ ACR ~ FR. In table 2, we note that the intra-state distribution sensitivity does not favour CR over R and hence the ranking R ~ CR holds.

An ex post calculation, as laid out in section 3, with sensitivity to the intra-state distribution yields precisely the same ordering. Other cases are listed in Table 6.

Reduce outcome inequalities	Ex post	Intra-State	$R \sim CR \succ ACR \sim FR$
Avoid catastrophes	Ex post	Inter-State	$R \sim ACR \sim FR \succ CR$
Reduce expectational inequalities	Ex ante	Inter-Personal Prospect	$R \sim ACR \sim CR \succ FR$
Reduce individual risk	Ex ante	Intra-Personal-Prospect	$R \sim FR \succ ACR \sim CR$

Table 6. Ranking of prospects for single-concern PAs

The basic model for the assessment of prospects on the Distribution View is now in place. We can now add various layers of complexity so as to move closer to real-world prospect assessment.

6. *Towards Real-World Prospect Assessment*

In the real world, the PA will be facing prospects affecting multiple people and with many not necessarily equiprobable states. This poses no problem. If we have matrices of utilities measured on a ratio scale and we have recorded the type of distributional concerns that the PA brings to bear to the problem at hand, then we calculate the value of each prospect.

We can also give up on the binary framework and permit the PA to register different levels of distributional sensitivities. So far we have assumed that a particular distributional sensitivity is either on or off. If it is on, then the the function maps a vector into the square of the average of the square roots of the vector's values. If it is off, then the function maps a vector into the average of the vector's values. This binary function is a special case of the following one-parameter family with γ = ½ for on and γ = 0 for off:

(1) $$f(< v_1, \dots, v_n >) = \left(\frac{\sum_{i=1}^{n} v_i^{(1-\gamma)}}{n}\right)^{\left(1/(1-\gamma)\right)} \quad \text{for } \gamma \in [0, +\infty) \text{ and } \gamma \neq 1;$$

$$\exp\left(\frac{\sum_{i=1}^{n} \ln(v_i)}{n}\right) \quad \text{for } \gamma = 1.$$

The function ranges from 0 risk neutrality (for equiprobable states) or inequality neutrality to +∞ for extreme risk aversion or inequality aversion. (*Cf.* Fleurbaey, 2010.) This permits us to model the PA's sensitivity to a particular distribution on a continuous scale.

So far our PA was only allowed to register a single concern. We can also model a PA who registers multiple distributional concerns.

She may wish to apply these concerns in a lexical fashion. For example, suppose that she says that it is of foremost importance to her to reduce individual risk and, if there is a tie, then she wishes to avoid catastrophes. Look at Table 6: By sensitivity to the Intra-Personal-Prospect Distribution, R ~ FR ≻ ACR ~ CR and by sensitivity to the Inter-State Distribution, we break the tie: R ~ FR ≻ ACR ≻ CR.

Alternatively, she may wish to give these concerns different weights. Now suppose that she assesses the prospects on the ex ante route and registers ex ante distributional sensitivities of different strengths. For example, she may set her sensitivity to the intra-personal-prospect distribution at γ = 1/2 and the sensitivity to the inter-personal-prospect distribution at γ = 2/3. Then the value of each personal prospect is the square of the average of the utilities' square roots and the value of the prospect is the cube of the average of individual-prospect values' cube roots.

Let us see how this plays out using our calculus. We first calculate the value of each personal prospect following (1). Note that if $v = v_1 = \ldots = v_n$, then $= f(< v_1, \ldots, v_n >) = v$ for any value of γ. So for R, the value of each person's personal prospect equals 2/3. For FR, the value of one person's personal prospect equals 0 and of the other two people 1. For ACR and CR, the value of each person's personal prospect equals $(1/3\sqrt{1} + 1/3\sqrt{1} + 1/3\sqrt{0})^2 = 4/9$. We can now calculate the overall values of the prospects. For R, the overall value equals 2/3. For ACR and CR, the overall value equals 4/9. And for FR, the overall value equals $\left(1/3\sqrt[3]{1} + 1/3\sqrt[3]{1} + 1/3\sqrt[3]{0}\right)^3 = 8/27$. Hence, R ≻ ACR ~ CR ≻ FR.

To get an intuitive feel for this result, return to Table 6. On ground of sensitivity to the inter-personal-prospect distribution we have R ~ ACR ~ CR ≻ FR. Sensitivity to the intra-personal-prospect distribution would dictate FR ≻ ACR ~ CR. But the latter sensitivity is weaker than the former and so ACR ~ CR ≻ FR stands. The latter sensitivity also dictates R ≻ ACR ~ CR. And even though it is a weaker sensitivity, it is strong enough to break through the tie between R on the one hand and ACR ~ CR on the other hand. Hence, in line with our calculus, R ≻ ACR ~ CR ≻ FR.

But what should we do when the PA registers both ex ante and ex post sensitivities? To model this, we need to make an additional assumption: The relative strength of the PA's ex ante and ex post distributional sensitivities should determine the relative prominence of the ex ante route and the ex post route in her calculations. So suppose that she attaches limited weight to all sensitivities (say, $\gamma = 1/2$) except to the inter-state-distribution (say, $\gamma = 3/2$). Then the value of the prospect is the weighted sum of the ex ante value of the prospect and of the ex post value of the prospect. The weights are the relative weights of the sum of the ex ante parameters (i.e. $(1/2 + 1/2) / (1/2 + 1/2 + 1/2 + 3/2) = 1/3$) and of the sum of the ex post parameters (i.e. $(1/2 + 3/2) / (1/2 + 1/2 + 1/2 + 3/2) = 2/3$.

We can now specify a general method for evaluating prospects which can work with any distributional sensitivity the PA may hold. Rather than adding more formalism, we will do so in a discursive manner.

(a) To determine the value of a prospect, we specify its ex ante value and its ex post value.

(b) To determine the ex ante value, we first calculate the value of each personal prospect by applying the function f to the row utilities with a value for the parameter γ that expresses the PA's sensitivity to the intra-personal-prospect distribution. We then calculate the ex ante value of the prospect, by applying f to the values of the personal prospects with a value for γ that expresses the PA's sensitivity to the inter-personal-prospect distribution.

(c) To determine the ex post value, we first calculate the value of each state by applying f to the column utilities with a value for γ that expresses the PA's sensitivity to the intra-state distribution. We then calculate the ex post value of the prospect by applying f to the values of the states with a value for γ that expresses the PA's sensitivity to the inter-state distribution.

(d) The value of the prospect is the weighted sum of the ex ante and the ex post values, with the weights being the relative weights of the sum of the ex ante parameters and the sum of the ex post parameters over the sum of all parameters.

(e) The PA weakly prefers one prospect over another if the value of the former weakly exceeds the value of the latter.

We can work this general method towards reflective equilibrium. First, we can try to elicit the specific distributional sensitivities of a PA by presenting her with limited information concerning prospects. For example, we can present her with sets of expectations and determine her equally distributed equivalents to assess her inter-personal-prospect sensitivity. The same holds for her other distributional sensitivities. Second, we can elicit a ranking over full-fledged prospects and determine (by computational means) what range of the four parameter values would generate such rankings. We can generate a consistent model of the PA's assessment of prospects by working back and forth until we have eliminated inconsistencies and reached reflective equilibrium.

We can also use the model for the purpose of constructing a normative ordering over prospects in a particular sphere of policy making. I argued above that for certain types of policies certain distributional sensitivities may be more or less fitting. Spelling out sphere-specific norms for relative sensitivities will provide guidance in policy ranking.[1]

[1] I am grateful for discussions with Richard Bradley, Marc Fleurbaey, Alexandru Marcoci, Wlodek Rabinowicz, and Alex Voorhoeve. The work was partially

London School of Economics and Political Science

Department of Philosophy, Logic and Scientific Method

London WC2A2AE, UK

L.Bovens@LSE.ac.uk

References

Adler, M.D. and Sanchirico, C.W. 2006. Inequality and uncertainty: theory and legal applications. *University of Pennsylvania Law Review* 155: 279–377.

Adler, M. 2011. *Well-Being and Fair Distribution: Beyond Cost-Benefit Analysis*. Oxford: Oxford University Press.

Bovens, L. 2015. Concerns for the poorly off in ordering risky prospects. *Economics and Philosophy* (forthcoming).

Broome, J. 1984a. Uncertainty and Fairness. *Economic Journal*, 94: 624–32.

Broome, J. 1984b. Selecting People Randomly. *Ethics*, 95: 38–55.

——— 1991. *Weighing Goods: Equality, Uncertainty and Time*. Oxford: Blackwell.

Atkinson, A.B. 1970. On the Measurement of Inequality. *Journal of Economic Theory*, 2: 244–263.

Bovens, L. and Fleurbaey, M. 2012. Evaluating Life or Death Prospects. *Economics and Philosophy*, 28: 217–249.

---

supported by the Swedish Collegium for Advanced Studies (SCAS) in Uppsala, Sweden.

Chew, H.S. and Sagi, J.S. (2011) An Inequality Measure for Stochastic Allocations. *Journal of Economic Theory* 147: 1517-1544.

Diamond, P. (1967) Cardinal Welfare, Individualistic Ethics, and Interpersonal Comparisons of Utility: Comment. *Journal of Political Economy* 75: 765–766.

Fleurbaey, M. (2010) Assessing risky social situations. *Journal of Political Economy* 118: 649–680.

Harsanyi, J. (1955) Cardinal welfare, individualistic ethics, and interpersonal comparisons of utility. *Journal of Political Economy* 3: 309–21.

Keeney, R.L. (1980) Equity and public risk. *Operations Research* 28: 527–534.

McCarthy, M. (2006) Utilitarianism and Prioritarianism I. *Economics and Philosophy*, 22: 335–63.

—————— (2008) Utilitarianism and Prioritarianism II. *Economics and Philosophy*, 24: 1–33.

Otsuka, M. and Voorhoeve A.E. (2009) Why it Matters that Some are Worse off than Others: an Argument against the Priority View. *Philosophy and Public Affairs* 37: 172–99.

Otsuka, M. (2012) Prioritarianism and the Separateness of Persons. *Utilitas* 24: 365–380.

Parfit D. (1997) Equality and Priority. *Ratio (new series)*, X 3, 202–221.

Parfit, D. (2012) Another Defence of the Priority View. *Utilitas*, 24: 399–440.

Rabinowicz, W. (2002) Prioritarianism for Prospects. *Utilitas*, 14: 2–21.