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POLICY EVALUATION UNDER SEVERE UNCERTAINTY

A Cautious, Egalitarian Approach

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1. Introduction

When policymakers evaluate a policy, they are typically unsure what will result from choosing it. In welfare economics, such a lack of knowledge is commonly dealt with by (i) assigning precise probabilities to the possible outcomes of every policy under evaluation; (ii) assigning a value to each of these possible outcomes, for example, by using a social welfare function that evaluates the distribution of well-being in each possible outcome; and finally (iii) recommending the policy with the highest expected value (the probability-weighted sum of the values of its possible outcomes) (Fleurbaey 2010; Adler 2019). Here, I will follow the common practice in decision theory and call situations in which a decision-maker is in a position to make such expected value calculations "decision-problems under risk."

Sometimes, however, those who decide on a policy are not able to compute these expected values for it because they are unable to nonarbitrarily assign precise probabilities to every one of its possible outcomes. Here, I shall follow Knight (1921) and Keynes (1937) and refer to such situations as "uncertain." [Following Ellsberg (1961), such situations are also commonly referred to as "ambiguous".] Throughout, I use both "risk" and "uncertainty" in their subjective senses – as pertaining to the beliefs about the chances of possible outcomes of their decisions that a rational decision-maker can form on the basis of their prior beliefs and the evidence available to them. (For further discussion of the contrast between risk and uncertainty, see Stefánsson, Chapter 3.)

In welfare economics and political philosophy, there has been far more discussion of how to complete the expected value evaluation of policies than of how to make public decisions under uncertainty. In this chapter, I take a step toward remedying this comparative neglect. This project is worth pursuing because severely uncertain situations are common and important. One example is climate change (Heal and Millner 2018). In judging climate policies, policymakers face both climate-scientific uncertainty – about how the climate system works and would react to various emissions scenarios – and socioeconomic uncertainty – about how individuals and societies will respond to changes in climate. Climate-scientific uncertainty arises because our main source of predictions about what might happen in various emissions scenarios are climate models. These are sensitive to changes in specified initial conditions, which are only imperfectly known. They are also highly sensitive to the choice of functional forms by which key relationships are represented and the choice of key parameter values, both of which are also imperfectly known (Frigg et al. 2014). There is also scientific disagreement about some key causal mechanisms, how important they are, and how they

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interact with widely accepted mechanisms. Because of the diversity of these sources of uncertainty, some of which cannot be captured by probability distributions over different potential initial values, functional forms, parameter values, and causal mechanisms, and because these different sources interact in the context of extremely sensitive models, it is commonly thought that it is not possible to nonarbitrarily capture current climate-scientific knowledge by assigning a precise probability to key propositions, such as that, for example, in a "medium emissions scenario," the Earth will warm by more than 2.0 degrees centigrade (Dietz 2014; Heal and Millner 2018). For this reason, the most authoritative report available, that produced by the Intergovernmental Panel on Climate Change (IPCC), assigns only ranges of probabilities to such propositions. For example, it reports that in one medium emissions scenario, "warming is *likely* to exceed 2.0 degrees centigrade," where "likely" means "has a probability of between 66% and 100%" (IPCC 2014, p. 10).

Social-scientific uncertainty about the impact on societies and people's lives of various degrees of warming is arguably greater still (Heal and Millner 2018), for there is very little evidence about how changes in climate might affect such things as political stability, migration flows, or economic growth. Consequently, experts regard socioeconomic impact assessments as highly speculative (Dietz 2014; Heal and Millner 2018). It follows that it would represent a leap beyond the information available to assign precise probabilities to outcomes of interest, such as "there is 3.0 degrees warming, a permanent loss of economic output of 5% of GDP, and there are large forced migration flows."

A second example of decision-making under severe uncertainty is presented by novel pandemics. Again, the sources of uncertainty are multifarious. In the early months of the COVID-19 pandemic, for example, there was lack of information and there were grave differences in expert opinions about such key variables as the transmissibility of the virus that causes COVID-19, its infection fatality rate, and the potential effectiveness of novel treatments and vaccines. There was also a notable lack of information and consensus about how various social and movement measures (e.g., mask wearing and lockdowns) might be expected to impact the virus' spread and, more broadly, health and other components of well-being. A significant source of information for policy decisions in the early months was non-peer-reviewed models of disease spread. These models are nonlinear, and their outcomes are highly dependent on assumed initial conditions and parameter values. Because of this sensitivity, small differences in these assumptions readily generated outcomes of interest (e.g., "deaths from disease with a given policy") that differed by several orders of magnitude (Avery et al. 2020, pp. 10–11, 20). Moreover, these assumptions were highly uncertain: initial conditions were unknown, functional forms were disputed, and parameter values were often ad hoc. These diverse sources of uncertainty meant that there was no clear basis to assign precise probabilities to even one aspect of interest in evaluating policies, namely, their impact on the spread of disease and associated deaths. Indeed, among five models of possible numbers of deaths in the United Kingdom and the United States that achieved prominence in policy discussions early in the pandemic, only one provided probabilities for its estimates, and those were dubious (Avery et al. 2020, p. 26). The quality of information on the possible wider health, social, and economic impacts of social and movement measures such as lockdowns was, at the time, equally poor, in part because of the lack of precedent for such measures in contemporary economies. The assignment of precise probabilities to the possible outcomes of key policies would therefore have represented a leap beyond the available evidence.

In this chapter, I outline an approach to policy evaluation for such uncertain situations. There is political-philosophical work to be done in using the tools of decision theory for this purpose, for the bulk of the literature has been devoted to the question of how, under uncertainty, people actually do and rationally may make decisions *on their own behalf*. There is less work on how to make *public* decisions in the absence of precise probabilities.[1]

I proceed as follows. In Section 2, I outline a pluralist egalitarian theory of distributive justice for situations of risk that I will take as my point of departure. In Section 3, I make the case for the permissibility of using a cautious decision criterion under uncertainty. In Section 4, I explore

some implications of incorporating this form of caution into the outlined egalitarian view. I show that caution strengthens one element of egalitarian solidarity by reinforcing its concern for those who may end up worse off than others. But I also show that it may counteract another element of such solidarity, namely, the tendency to ensure that everyone "sinks or swims" jointly. In Section 5, I conclude.

2. Egalitarianism Under Risk

In the pluralist egalitarian view that I shall draw on here, people's interests should be considered from two perspectives. The first is in terms of the value of their prospects. A person's prospects are important because they capture the extent to which a policymaker's actions promote this person's interests as they are rationally viewed with the information at hand when deciding on a policy. The second is in terms of each person's final well-being. This is relevant because it represents the interests that a policymaker should aim to see advanced equally, if they were fully informed about how each person would end up faring.

In the proposed egalitarian view, it is unfair when people's interests in having good prospects and in faring well are advanced unequally. Besides the goal of limiting these two forms of inequality, the view in question is also concerned with promoting people's interests, both in prospects and in terms of their final well-being. In sum, in this view, a policymaker should adopt the following aims: (i) to reduce inequalities in the value of people's prospects; (ii) to reduce inequality in final well-being; (iii) to improve people's prospects; and (iv) to improve final well-being.[2]

Throughout, I assume an interpersonally comparable, cardinal measure of well-being derived from idealized preferences under risk. By this measure, a first policy yields higher expected well-being for a person than a second policy just in case it would be preferred for this person's sake after rational deliberation with relevant knowledge while taking into account only this person's self-interest. A first policy yields the same expected well-being as a second policy for a person if and only if such a deliberator would be indifferent between the two policies on this person's behalf. [For a defense of this measure, which is common in some areas of welfare economics, see Adler (2019), Appendix D.] I shall also assume that, even though individuals' actual preferences of risk may diverge from this idealization because of reasoning errors and biases, individuals accept the idea that their good should be measured by the preferences they would have after deliberation that corrected these errors and biases, so that in measuring their well-being by these idealized preferences, we are aligning ourselves with their judgments (Arneson 1990). Finally, I assume that in situations of risk it is permissible for a policymaker to maximize expected moral value. In sum, I adopt an orthodox approach under risk. This allows me to focus on the departure I make from orthodoxy in cases of severe uncertainty.

To illustrate the outlined egalitarian view under risk, picture a resource allocation manager in a government-run health system. Two 20-year-old citizens, Ayan and Bashir, face a debilitating illness which, if untreated, will leave them unable to walk and so limited in dexterity that they will require the help of another person for most tasks. Consequently, they will have a lifetime well-being value of 30 (a merely tolerable quality of life). If fully cured, each would have a lifetime well-being value of 80 (a very good quality of life). The manager does not have enough resources to fully cure them both for sure. Instead, they can allocate resources toward one of the alternatives outlined in the top section of Table 34.1. To use Ellsberg's (1961) paradigmatic contrasting presentations of risky and uncertain alternatives, risk will be represented by a random draw from an urn that is known to contain only 50 red balls and 50 black balls. The numbers in parentheses in the table are the probabilities associated with each draw.

In what follows, for simplicity, I shall evaluate such alternatives while setting aside all considerations besides the well-being of the individuals in question. In a choice between *inequality under*

Table 34.1 Final well-being for all alternatives

Risky alternatives	*Draw from a risky urn*	
	Red (0.5)	*Black (0.5)*
Inequality under certainty		
Ayan	80	80
Bashir	30	30
Equal risk, unequal final well-being		
Ayan	80	30
Bashir	30	80
Equality under certainty		
Ayan	55	55
Bashir	55	55
Equality under risk		
Ayan	80	30
Bashir	80	30
Uncertain alternatives	*Draw from an uncertain urn*	
	Red (0.2–0.8)	*Black (0.2–0.8)*
Equality under uncertainty		
Ayan	80	30
Bashir	80	30
Equal uncertainty, unequal final well-being		
Ayan	80	30
Bashir	30	80

certainty, which cures Ayan and leaves Bashir severely debilitated, and *equal risk, unequal final well-being*, which will cure precisely one of them but gives each an equal chance at being cured, the outlined egalitarian view chooses the latter. There is, the view holds, less unfairness when each is given an equal chance at a cure than when one is given a cure outright and the other has no chance of receiving it. *Equality under certainty* is, naturally, better still because, by giving both a partially effective treatment that leaves them with a moderately good life with a level of well-being precisely midway between grave disability and a full cure, it eliminates inequality in final well-being at no cost in total expected well-being. Finally, the view regards *equality under certainty* to be just as good as *equality under risk*, because the latter also involves no inequality and offers each person the same expected well-being as the former.

This series of judgments is the upshot of combining a concern for eliminating unfair disadvantage in the value of prospects and in how people end up with a decision theory that is risk neutral in personal good and moral value. It also has a grounding in a central idea of much of the post-WWII egalitarian literature on distributive justice, namely, that an individual's life has a unity that a bare mass of people does not and that, consequently, moral precepts for pure intrapersonal trade-offs without inequality differ from precepts for trade-offs between distinct individuals' interests (Gauthier 1963, pp. 121–127; Nagel 1970, p. 138; Rawls 1999, pp. 23–24). The integrality of a person's life gives us reason to make pure intrapersonal trade-offs with the aim of maximizing this person's expected well-being, as prudence dictates (given the assumed measure of well-being). The distinctions between persons, meanwhile, demand that when people's interests conflict, we have greater concern for those who are less well-off. This idea motivates choosing *equal risk, unequal final*

well-being over *inequality under certainty*. This choice involves an opposition of interests in having valuable prospects between Ayan and Bashir, which – given the fact that total expected well-being is constant – it resolves by maximizing the prospects of the least well off. It also motivates choosing *equality under certainty* over *equal risk*, *unequal final well-being*, because this choice involves a conflict of final well-being interests, with it being in the final well-being interest of whoever would end up worse off under *equal risk, unequal final well-being* that *equality under certainty* had been chosen instead, while the opposite would be in the final well-being interest of whoever would end up better off under *equal risk, unequal final well-being*. Given that these alternatives yield the same total well-being, the separateness of persons requires that this conflict be resolved in favor of the least well off. Finally, respect for the unity of the individual supports regarding *equality under certainty* and *equality under risk* as equally choice worthy, because the choice between them involves no conflicts of interest in terms of prospects or final well-being (and no inequality), so that we may choose any policy that maximizes each person's prospects.

3. Caution Under Uncertainty

Let us now consider cases of uncertainty. Suppose again that Ayan and Bashir will suffer the aforementioned grave disability unless they are treated. The resource allocation manager must either allocate resources toward the treatment described by *equality under risk* from Table 34.1, which, due to its extensive track record, they rationally believe offers a 0.5 chance of fully curing both and a 0.5 chance of being wholly ineffective for both, or instead allocate resources toward a new treatment, *equality under uncertainty*, which will also either fully cure both or be wholly ineffective for both and for which the limited evidence available suggests that its chance of yielding a full cure ranges somewhere from 0.2 to 0.8. It is depicted in the lower part of Table 34.1. In line with Ellsberg's (1961) presentation, uncertainty here is represented by a random draw from an urn known to contain precisely 100 balls, all of which are either red or black, with the only information available being that at least 20 and at most 80 of these balls are red (i.e., no information is available about the process by which the urn has been filled). Which treatment(s) is it permissible for the manager to provide?

In this choice, I submit that it is permissible for the manager to provide the treatment to which they can assign precise probabilities. Moreover, it would be permissible for them to have a strict preference for this treatment and to provide it even if it carried some small cost, in the sense of slightly worsening the final well-being outcomes for Ayan and Bashir. To be precise, suppose that the choice of *equality under risk* would result in cost c for each person in every event, so that if red were drawn, Ayan and Bashir would each end up with a well-being of $80 - c$, and if black were drawn, they would each end up with $30 - c$. My claim is that there is a $c > 0$ for which it would be permissible to choose *equality under risk*.

The argument for this judgment proceeds in three steps (Joyce 2005, pp. 168–171; Gilboa, Postlethwaite, and Schmeidler 2009). First, rationality does not require us to go beyond the evidence and assign, arbitrarily, precise probabilities to the outcomes of each alternative that we might choose. Instead, it permits us simply to represent our beliefs in terms of ranges of probabilities assigned to each possible outcome as, say, the IPCC does for the medium emissions policy mentioned in the Introduction when they judge that there is between a 66% and 100% chance that this policy would lead to warming of more than 2.0 degrees. In our novel treatment example, this means we need not move beyond the assumption that the chance of this treatment fully curing Ayan and Bashir ranges from 20% to 80%.

Second, when we have only such imprecise probabilities, we cannot compute a single expected value for a prospect. But we can compute a range of such expected values. In the IPCC example, if we assume that more warming is worse, the worst expected value of the medium emissions policy will be one in which there is a 100% chance that it leads to more than 2.0 degrees of warming, and

the best expected value of this policy is that there is only a 66% chance that it leads to such warming. All the IPCC's information allows us to say is that the expected value of this medium emissions prospect is in the range given by these values. In our novel treatment example, this means that for each person, *equality under uncertainty* has an expected value in the range of 40 (the possible outcomes weighted by the least favorable probability distribution consistent with our evidence, that is, $0.8 \times 30 + 0.2 \times 80$) to 70 (the possible outcomes weighted by the most favorable probability distribution consistent with our evidence, that is, $0.2 \times 30 + 0.8 \times 80$).

Third, in the face of this range of expected values, it is permissible to be cautious, in the sense that, in making an overall assessment of the uncertain prospect's value, we may permissibly give more decision weight to the less good expected values than the better expected values. To apply it to our examples: when assessing the prospect associated with a policy of medium emissions, we are permitted to give more decision weight to the possibility that this would certainly lead to more than 2.0 degrees of warming than to the possibility that this would only have a 66% chance of leading to such warming. And in the novel treatment case, we can permissibly take the prospective value of the novel medicine for Ayan and Bashir to be less than the midpoint between 40 and 70. (So less than 55, the expected value of the well-known medicine.)

The basic ideas in this argument are simple and attractive: there is no requirement to go beyond the evidence and permission to be cautious in the face of lack of evidence. The upshot is that what is known as *uncertainty aversion* (a strict preference for prospects with precise probabilities over otherwise analogous prospects without such probabilities) is permissible. There is a further dimension to the issue that arises for policymakers, namely, the attitudes toward uncertainty of the people whose prospects and fates hang in the balance. In general, respect for citizens' reasonable judgments of their own good makes it fitting for a policymaker to, as far as possible, track the rationally permissible attitudes of their citizens toward their own interests (Arneson 1990). Here, I include people's rationally permissible attitudes toward uncertainty in these judgments that policymakers have reason to respect. I also assume what I take to be a common situation for policymakers, which is that they do not know the uncertainty attitudes of every member of their population, but they do know the general social-scientific findings about these attitudes. Empirical studies suggest that, in self-interested choices, both uncertainty aversion and uncertainty neutrality (which involves indifference between uncertain and analogous risky alternatives) are common, and uncertainty-loving behavior (which involves a strict preference for uncertain over comparable risky alternatives) is rare (Trautmann and van de Kuilen 2015, Table 34.1; Voorhoeve et al. 2016; Chew et al. 2018). It is therefore reasonable to hold that the assumption of a modest degree of uncertainty aversion on behalf of citizens would be the upshot of a procedure that minimized a reasonable measure of "aggregate distance" between citizens' diverse attitudes toward uncertainty. (For example, the mean attitude toward uncertainty suggested by the aforementioned studies would be one of modest uncertainty aversion.) If, for the reasons just outlined, uncertainty aversion is rationally permissible (possibly alongside uncertainty-neutral and uncertainty-loving behaviors), this would therefore make it reasonable for the decision-maker to employ a degree of uncertainty aversion as a good approximation of (or a reasonable compromise between) the differing reasonable attitudes of the individuals on whose behalf they are deciding.

It is important to note that, despite its appeal, the rationality of uncertainty aversion is disputed. The reason is that the assumption of uncertainty aversion is in tension with a core axiom of decision theory, the Sure Thing Principle. This means that uncertainty aversion has some unappealing implications.[3]

I cannot review here the extensive debate on the rational permissibility of uncertainty aversion. I will, therefore, briefly report my perspective on it, which is that the arguments show that not all independently attractive principles of rationality can be reconciled. In particular, there is at least an apparent tension between (i) the ideas that rationality does not require a decision-maker to posit precise probabilities for which they lack adequate ground and that a decision-maker is allowed a

degree of caution in the face of such imprecision, and (ii) the idea that a decision-maker should respect other attractive principles of rational choice, such as the Sure Thing Principle. There are different reasonable ways of navigating this inconsistency, among which are uncertainty-averse decision principles (Gilboa et al. 2009; Siniscalchi 2009; Heal and Millner 2018).

There are several leading uncertainty-averse decision criteria. For concreteness, here I shall use a well-known, simple criterion that is often traced back to Leonard Hurwicz' work on decision-making under ignorance (Hurwicz 1951). My conclusions also hold for other leading criteria, for example, those advanced in Gilboa and Schmeidler (1989) and Klibanoff et al. (2005).

In what is known as α-maxmin expected utility, the decision-maker values a prospect by taking α × the worst expected value that is consistent with their information and prior probability distribution and adding $(1 - \alpha)$ × the best expected value that is so consistent, where $0 \leq \alpha \leq 1$ is the decision weight given to the worst expected value (Binmore 2009; Wakker 2010, sec. 11.5.) A cautious evaluator will give more decision weight to the worst expected value – that is, they will have $\alpha > 0.5$ – and this will lead them to be uncertainty averse. An uncertainty-neutral evaluator will give equal weight to both – that is, they will have $\alpha = 0.5$. An uncertainty-loving evaluator will give greater weight to the best expected value, that is, they will have $\alpha < 0.5$. I shall, in the rest of this chapter, explore what follows if we assume a fixed, moderate degree of uncertainty aversion for all objects of evaluation – that is, for the evaluation of individual and social prospects. This implies an invariant α somewhat larger than 0.5.

To illustrate, consider again the novel treatment represented by *equality under uncertainty*, and suppose for concreteness that $\alpha = 0.6$. The α-maxmin expected utility criterion then evaluates Ayan's uncertain prospect as follows: $0.6 \times (0.8 \times 30 + 0.2 \times 80)$ (the worst expected value) + $0.4 \times (0.2 \times 30 + 0.8 \times 80)$ (the best expected value) = 52. This is 3 units of well-being less than the corresponding risky treatment. In what follows, I shall refer to this diminution of the value of an individual's prospects due to uncertainty as the "individual-level burden" of uncertainty. Naturally, the value of Bashir's prospects under *equality under uncertainty* is similarly depressed. But besides these individual-level burdens, this case involves what I shall call "social-level uncertainty" about the distribution of final well-being, for the facts that either both will end up fully cured or both will end up with a severe disability and that there are no precise probabilities for these outcomes may depress the prospective value of the social distribution of final well-being as compared to a counterpart policy under risk.

4. Cautious Egalitarianism

I shall now review a few key implications of incorporating this form of uncertainty aversion in the form of pluralist egalitarianism outlined in Section 2. In each instance, I shall connect the findings from simple cases to general considerations of justice and policymaking.

First, uncertainty-averse egalitarianism posits a novel object of egalitarian concern: the degree to which individual-level uncertainty depresses the value of individuals' prospects (Rowe and Voorhoeve 2018, pp. 255–256). An illustrative case of unequal burdens of uncertainty arises in the comparison of the uncertainty faced by people who live in regions and work in professions that are unlikely to be gravely disrupted by temperature rises (e.g., office workers in temperate zones) and those whose locations and jobs are such that their lives and livelihoods would be severely affected by changes in the climate (e.g., farmers in marginal lands in the Sahel) (Denning et al. 2015). Another illustration concerns the differential burden of uncertainty around the negative impact on well-being of lockdowns to deal with COVID-19 in many countries. When first implemented, the range of potential impacts on well-being (and therefore the depressing effect of uncertainty on individuals' prospects at the moment of implementation) was arguably less for those in rich nations who could work remotely and who had access to government support if they should need it than it was for

those in poorer nations who rely on the informal economy, whose work might be most disrupted by these measures, and who often have difficulty accessing social safety nets (Ray and Subramanian 2020). An uncertainty-averse, egalitarian view sees strong reasons to improve the prospects of those who face greater uncertainty, for example, by insuring them against the downside of their imprecisely estimated risks or by gaining additional information and thereby narrowing the imprecision in these estimates.

Second, the proposed cautious, egalitarian approach will favor policies for which a better basis is available for assigning probabilities to outcomes. This was already clear in the comparison made (at the end of Section 3) of *equality under risk* with its uncertain counterpart, *equality under uncertainty*. The same is true in a choice between *equal risk, unequal final well-being* and its uncertain counterpart, *equal uncertainty, unequal final well-being*, which is depicted in the lower part of Table 34.1. After all, the individual-level uncertainty created by the latter policy depresses the value of both individuals' prospects compared to its risky counterpart. One practical implication is that it is permissible for governments to go to greater expense to mitigate severely uncertain threats to life (e.g., posed by a novel pandemic) than to mitigate threats to which they can readily attach probabilities (e.g., posed by traffic accidents).[4]

A third key implication is that when, under uncertainty, some will gain and others will lose, uncertainty aversion reinforces the egalitarian tendency to allocate resources to those who will end up less well off (Rowe and Voorhoeve 2018, pp. 257–259). To see why, suppose that a policymaker must choose between *equal uncertainty, unequal final well-being* and *equality under certainty* in Table 34.1, but with the latter modified so that it comes at a cost c to each person's final (and prospective) well-being, so that it would yield only $55 - c$ for each person for sure, with $0 \leq c \leq 25$. In the proposed egalitarian view, in choosing between these options, we should consider both the value of individual prospects and the prospective value of the distribution of final well-being. Under *equal uncertainty, unequal final well-being*, the value of individuals' prospects is depressed by the limited information available about their likelihood of ending up badly off. An uncertainty-averse policymaker should therefore be willing to incur at least some small cost to eliminate this uncertainty. In considering the distribution of final well-being, a downside of *equal uncertainty, unequal final well-being* is inequality in how people will end up faring. Inequality aversion will therefore prompt a policymaker to incur a cost to eliminate this inequality.

It follows that both uncertainty aversion and inequality aversion will direct us to incur a cost to remove inequality in this kind of case. What is more, together, they will direct us to incur a higher cost to achieve equality than either one of these considerations alone would countenance (Rowe and Voorhoeve 2018, pp. 258–259). To understand why, assume for a moment that our inequality-averse policymaker was uncertainty neutral (that is, their $\alpha = 0.5$). They would then evaluate *equal uncertainty, unequal final well-being* as equivalent to *equal risk, unequal final well-being*. Suppose that in a choice between *equal risk, unequal final well-being* and *equality under certainty*, with a cost c to each person, the correct degree of inequality aversion will direct us to incur a cost of up to, but no greater than, $c^\star$ units of prospective well-being for each person, so that both *equal uncertainty, unequal final well-being* and *equal risk, unequal final well-being* would be equivalent to giving Ayan and Bashir each $55 - c^\star$ for sure. Next, assume that our policymaker becomes uncertainty averse (that is, their $\alpha > 0.5$). They will then find *equal uncertainty, unequal final well-being* strictly worse than *equal risk, unequal final well-being*. By transitivity, they will then regard the uncertain alternative as strictly worse than giving Ayan and Bashir each $55 - c^\star$. In other words, they will find *equal uncertainty, unequal final well-being* to be as good as *equality under certainty* only for a cost larger than $c^\star$. We can conclude that, in cases in which individual-level uncertainty will lead to some faring better than others, uncertainty-averse egalitarianism justifies incurring a larger cost in order to achieve both equality and certainty than an uncertainty-neutral egalitarian view would countenance. After all, under these

circumstances, the direction of benefits from the lucky to the unlucky reduces the stakes for each and thereby reduces the burden of uncertainty; naturally, it also diminishes inequality. A policy issue to which this may be relevant is levying "windfall taxes" on firms and people who gain due to severely uncertain economic developments and spending these taxes on improving the situation of the losers. [This is a policy that has been considered in the United Kingdom, for example, in response to the COVID-19 crisis; see Cowburn (2021)]. Such policies that reduce the variability of incomes under uncertainty will be valuable both because they reduce the burden of uncertainty and because they reduce inequality.

A fourth key conclusion starts from the observation that individual-level uncertainty need not imply social-level uncertainty about the distribution of final well-being. To see why, consider again *equal uncertainty, unequal final well-being* in Table 34.1. The individual-level uncertainty depresses the value of everyone's prospects. However, it has no social-level uncertainty about the value of the possible distributions of final well-being. The anonymized distribution of final well-being is known: one person will be fully cured, while another will remain severely disabled.

This has an important implication for how the ranking of policies under risk compares to the ranking of their counterpart policies under uncertainty. *Equality under risk* is, in the proposed egalitarian view, strictly preferred to *equal risk, unequal final well-being*, because the former eliminates all inequality without any loss in terms of the value of individual prospects or in the value of the prospective distribution of final well-being. However, the ranking of these policies' uncertain counterparts is less straightforward. In terms of the value of individual prospects, *equality under uncertainty* and *equal uncertainty, unequal final well-being* are identical. However, in terms of the prospective value of the possible distributions of final well-being, a concern for equality and a concern to reduce uncertainty may pull in opposite directions. On the one hand, it counts in favor of *equality under uncertainty* that it eliminates all inequality. On the other hand, because under this policy everyone sinks or swims together, it generates problematic uncertainty at the collective level. In contrast, *equal uncertainty, unequal final well-being* does not generate such collective-level uncertainty. This is one respect in which *equal uncertainty, unequal final well-being* may be better.[5]

The view I put forward here does not pronounce which of these two policies is superior overall. The key conclusion is just that uncertainty aversion may oppose the solidaristic, egalitarian impulse to bind everyone's fates together. In doing so, it changes egalitarianism in one important way (Rowe and Voorhoeve 2018, pp. 261–262). Under risk, the outlined egalitarian view has a tendency to allocate benefits away from the lucky and toward the unlucky, *if and only if the lucky are (or would be without an egalitarian allocation) better off than others and the unlucky are (or would be) less well off than others*. By way of illustration, as we have seen, the proposed form of egalitarianism is indifferent between *equality under risk* and *equality under certainty* in Table 34.1. Moreover, if *equality under certainty* could be purchased at only a small cost c to each person's well-being (so that it would yield only $55 - c$ for each person for sure, with c positive and small), the proposed egalitarian view would be unwilling to pay any cost in order to redistribute from the better off potential futures of Ayan and Bashir to their less well off potential futures. By contrast, under uncertainty, a cautious egalitarian will see reason to direct benefits from the lucky toward the unlucky *even when these are merely two potential futures of the same person and there is no inequality*. To see this, compare *equality under uncertainty* with *equality under certainty*. Due to uncertainty aversion, the latter is clearly preferable. Moreover, if *equality under certainty* could be purchased at only a cost c to each person's final (and prospective) well-being (so that it would yield only $55 - c$ for each person for sure), the proposed view would strictly prefer *equality under certainty* over *equality under uncertainty* for some small, positive c. Under uncertainty, cautious egalitarianism is therefore keen to direct benefits away from Ayan and Bashir's better possible futures toward their worse possible futures, even when their rosier futures would not involve them being better off than others.

As a practical matter, it follows from the proposed view that governments have a special reason to make provisions for collective setbacks to which they are not able to assign a precise probability. As a concrete illustration, if natural resource revenues are of this kind, then for governments that are highly dependent on revenues from these resources, this favors instruments such as hedges against price falls [used, for example, by Mexico to cover its oil revenues; see Reuters (2015)] or the creation of fiscal space to support the economy in the face of a price collapse [as has been practiced in Chile; see Céspedes et al. (2014)].

5. Conclusion

I have argued that, in uncertain situations, it is permissible for a policymaker to consider a range of expected values for each policy, rather than a single expected value. I have also argued that, in response to this range, it is permissible for a policymaker to assign greater decision weight to the lower expected values within this range. One reason I have offered for this approach is that a substantial share of the population whose fates are at stake in these decisions are likely to be uncertainty averse, and very few are likely to be uncertainty loving, so that a modest degree of uncertainty aversion in public decision-making is a reasonable compromise.

I have also explored some key implications of incorporating such uncertainty aversion into a pluralistic egalitarian theory of justice and of using such a theory for policy evaluation. I have argued that uncertainty aversion reinforces egalitarian reasons to reduce unfair inequalities and to resolve *inter*personal conflicts of interest in favor of the less well off. Moreover, it gives us new reasons to make *intra*personal trade-offs under uncertainty in a way that favors the person's less fortunate potential future. The upshot is a theory of justice that offers stronger reasons for safety-net policies, such as universal health coverage, unemployment insurance, and disability pay, that guard against individual and collective misfortune. Such policies are commonly defended as valuable because they improve people's prospects by reducing risks in relation to income and health in an efficient manner and because they reduce inequalities (Barr 2012; WHO 2014). But a consideration of severely uncertain situations reveals further functions of such a safety net. By aiding the unfortunate, it both reduces the depressing impact of uncertainty on the value of individuals' prospects and reduces policymakers' uncertainty about social outcomes. This finding is relevant for our two opening examples. In the context of climate change, higher emissions pathways are associated with greater variability in the moral value of possible outcomes and, therefore, with a larger disvalue of uncertainty (Millner et al. 2013); they are also projected to generate greater inequality (Denning et al. 2015). A cautious, inequality-averse approach will therefore hold that we have strong reasons to lower emissions (and more reasons than a common, expected-value-maximizing, utilitarian approach would register). In the context of the COVID-19 pandemic, this approach reinforces reasons to develop treatments and vaccines (because these will tend to improve worse possible futures) and to introduce social and movement measures to contain the spread of disease, so long as these are accompanied by income support for the worst off (Adler et al. 2020; Ray and Subramanian 2020). In short, uncertainty adds to policymakers' reasons to make provisions for the least fortunate.

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Related Chapter

Stefánsson, Chapter 3 "The Economics and Philosophy of Risk"

Notes

1 In moral and political philosophy, an exception to the neglect of severe uncertainty has been the discussion of how to make decisions behind John Rawls' veil of ignorance, which creates a severely uncertain situation by denying people knowledge of the probability of ending up in any particular social position (Rawls 1999, p. 134). In welfare economics, contributions that take account of this aspect of severe uncertainty in policy evaluation focus on environmental policy and pandemics. See, e.g., Liu et al. (2005), Treich (2010), Heal and Millner (2018), Berger et al. (2020), and Inoue and Miyagishima (2021).

2 This formulation leaves open the precise way these different aims of reducing inequality and promoting well-being are defined. For concreteness, I shall assume that the degrees to which prospects and final well-being are promoted are given by their total value. See Fleurbaey (2010), Voorhoeve and Fleurbaey (2016), and Voorhoeve (2021, appendix) for a proposed, more precise formulation of pluralist egalitarianism. The proposed form of egalitarianism builds on an extensive literature that emphasizes the importance of both people's prospects and final well-being, including Ulph (1982), Cohen (1989), Broome (1990), and Temkin (2001).

3 For a discussion on the Sure Thing Principle and uncertainty aversion, see Stefánsson, Chapter 3. For discussion of the problems to which this violation gives rise, see Al-Najjar and Weinstein (2009).

4 Such greater expense to prevent imprecise risks aligns with surveys on the value of reductions in fatality risks, in which individuals tend to place a premium on reductions in imprecisely over precisely specified chances of death (see Hammitt 2020, pp. 140–8).

5 This is true, at least, for some policymakers with a modest degree of inequality aversion. An extremely inequality-averse policymaker may well hold that there is no respect in which *equal uncertainty, unequal final well-being* is more valuable. For example, take a policymaker who uses the maximin rule to evaluate distributions of final well-being. They will hold that *equality under uncertainty* has a better distribution of final well-being than *equal uncertainty, unequal final well-being* in one state of the world and an equivalent distribution of final well-being in another, so that the former dominates the latter, despite uncertainty.

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