

# Do administrators have the same priorities for risk reductions as the general public?

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**Abstract** A stated preference survey was used to investigate the potential discrepancy between the priorities of public administrators and the general public regarding risk reductions. Both groups of respondents were asked to assume the role of a public policy-maker and choose between different public safety projects. We investigate differences in three areas: (i) large vs. small accidents, (ii) actual vs. subjective risk, and (iii) the trade-off between avoiding fatalities and serious injuries for different age groups and accidents. We find only minor differences between the responses of administrators and the general public, the most important of which is the difference in priorities between reducing the risk of many small or one large accident. In this area the most common response from the general public is that they prefer avoiding many small accidents rather than one large accident while among the administrators there is almost an equal split between the two options.

**Keywords** Accidents · Risk · Policy making · Stated preference

**JEL Classification** D61 · I18

Decisions on behalf of the general public with regard to their safety and well-being are made on a regular basis by politicians, local government officials and other public

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administrators. Examples include decisions on infrastructure investments that increase road safety, the location of a fire station, or the general budget for public hospitals. These decisions inevitably affect people's immediate environment and the risks they face in their day-to-day lives. The motivating factors behind these public decisions would vary considerably, ranging from pure self-interest to welfare maximization. Decisions could be based solely on actual risk reductions or could be influenced by other factors that may or may not reflect the preferences of those the decision will affect. Furthermore, it is not always clear what the preferences of the public are for many projects that reduce the risk of injury. Therefore, a decision maker, although intending to reflect the preferences of those the decision will affect, might fail to do so because of lack of information or understanding of the public's sentiment.

Why may there be differences between the preferences of the general public and the administrators? As discussed by Carlsson, Kataria and Lampi (2011) one important difference is that the administrator group will on average be better educated than the general public, which could potentially lead to differences in priorities. However, there are also two other alternative reasons for a difference in how they prioritize. The first is a sample selection explanation in that individuals who have a particular set of preferences for risk are more likely to become public policy administrators in this area. The second is that the administrators have changed their preferences on priorities as they acquire experience with these issues and possibly make more informed decisions.

The latter is also an explanation put forward by Viscusi (2001), who argues that judges who are experienced in accident trials and their verdicts are better able to judge such cases than jury-eligible citizens.

In order to investigate the potential discrepancy between the priorities of decision makers and those of the general public, a stated preference survey was conducted using a random sample of Swedish citizens and a sample of public administrators. Both groups of respondents were asked to assume the role of a public policy-maker and choose between different public infrastructure projects that result in different outcomes. We use the design introduced by Viscusi, Magat and Huber (1991) where subjects trade off risks for different outcomes, enabling us to estimate the marginal rates of substitution for different risk outcomes and allowing us to compare the priorities of both groups for different projects. We are aware of only one previous study in the area of risk and risk prevention that directly compares the priorities and decisions of the general public and administrators, namely Viscusi (2001), who compares the preferences of judges and juries, corresponding to administrators and the general public in the context of this study. In the area of environmental protection, some work has been done comparing administrators and the general public (Alberini, Longo and Riganti 2006; Carlsson, Kataria and Lampi 2011; Colombo et al. 2009). While the approaches and results vary somewhat between these studies, both Alberini et al. and Carlsson et al. find differences in preferences between administrators and citizens. The difference between our study and the previous ones is that we estimate the priorities of both groups when they are asked to act as policy-makers,<sup>1</sup> thereby

<sup>1</sup> Carlsson et al. (2011) also use the same method to elicit preferences of the two groups. However, only the administrator group was asked to act as policy-makers.

estimating what Johansson-Stenman and Martinsson (2008) call ethical preferences, i.e. preferences regarding the outcomes for other people.

Three different aspects that may affect priorities/preferences for risk reductions were in focus in our study: (i) large versus small accidents, (ii) actual versus subjective risks, and (iii) the trade-off between avoiding fatalities and injuries for different age groups in different accident contexts.

The first aspect that we wish to investigate is whether the size of an accident is a factor that would affect decisions. This was done by asking the respondents to choose between two different projects. Although the number of lives saved was the same in both, one project reduced the number of small accidents each involving few people while the other project avoided one large accident involving many fatalities.

Surprisingly, not many empirical studies have compared large and small accidents and the results from these are inconclusive. Slovic, Lichtenstein and Fischhoff (1984) disputed the assumption that people have catastrophe aversion just with regard to number of fatalities, supported by results from an experimental test with students. Similarly, Jones-Lee and Loomes (1995) did not find any effect of catastrophe aversion in a study of willingness to pay for underground safety. Contrary evidence was found in a small study of the preferences of public decision makers in France by Hubert, Barny and Moatti (1991) where results indicate a strong presence of catastrophe aversion with regard to industrial risks. Similar results were found in a choice experiment for fossil energy versus nuclear power by Iatoka et al. (2006). However, in the latter study it was found that when the probabilities were very low people seemed to disregard them and focus on the size of the losses, which may be an explanation for why catastrophe aversion is observed. In Viscusi (2009) the valuation of risks of fatalities from terrorist attacks, natural disasters and traffic is investigated. The study estimated the values for reducing the risk of terrorist attacks and traffic deaths to be very similar, while values for reducing risks of natural disasters are considerably smaller.

The second aspect we examine concerns objective and subjective risk perceptions. A number of studies show that in many situations, the perception people have regarding the level of risk is biased (Breyer 1993; Carlsson, Johansson-Stenman and Martinsson 2004; Setbon et al. 2005). Some recent papers argue that public policy should reflect both objective and perceived risk when the perceived risk is biased (Johansson-Stenman 2008; Salanie and Treich 2009), while others state that biased risk perceptions should not have an influence on public policy (Breyer 1993; Viscusi 2000). In this paper we investigate whether respondents hold the view that decisions should be based solely on actual risk reductions, or if they believe that the feeling of safety experienced by the public and thus the subjective risk perceptions of the general public should also be considered. In our survey question we use the number of saved lives, rather than probabilities which is customary; thus we control for possible bias, as not only ordinary people, but also experts may have problems with probability calculations (Kynn 2008).

The third aspect concerns the respondents' trade-off between avoiding fatalities and serious injuries for different age groups and causes of accidents. Governments are regularly required to implement policies in various sectors in order to prevent or reduce inhabitants' risk of injury and death. One of the more difficult ethical questions from a public policy perspective is whether the estimation of benefits from risk

reducing projects should vary across factors such as age groups and risk domains. For example, should a project that saves the lives of elderly people be assigned the same benefit value in cost-benefit analyses as one that saves the same number of children's lives, or should the values be differentiated? Should traffic accidents be given more priority than fire accidents or should the number of lives saved be the sole issue? What should be the trade-off between lives and serious injury? We examine whether the priorities of the two groups differ on these issues by observing the trade-offs made by the two groups in projects that vary between four attributes; context (fire or traffic accident), saving lives, reducing severe injuries, and affected age groups.

The studies that have estimated the marginal rate of substitution for the lives of children relative to adults have shown mixed results. Revealed preference studies on the use of seat belts and bicycle helmets found lower values for the lives of children (Carlin and Sandy 1991; Jenkins, Owens and Wiggins 2001) while the reverse was found by Blomquist, Miller and Levy (1996). Within the stated preference literature, most of the results indicate higher values for children than adults (Agee and Crocker 2008; Johansson-Stenman and Martinsson 2008; Leung and Guria 2006; Lewis and Charney 1989; Liu et al. 2000; Tsuchiya, Dolan and Shaw 2003). For example, Johansson-Stenman and Martinsson (2008) found that the relative value of a saved life decreases with age and that children were worth 1.7 times the value of 40-year-old adults. Agee and Crocker (2008) estimate parents' marginal rate of substitution between their own and their child's health and find that parents value their children's health over their own by almost two-fold. A recent stated preference study on disease risk by Hammit and Haninger (2010) found that the respondents' willingness to pay for saving a child was 80% higher than their willingness to pay for saving themselves. A few studies have also compared the relative value of the elderly to other adults. While results indicate that people are generally in favor of giving priority to the young over the old, there are considerable differences in the magnitude of divergence in the values given to different ages. Johannesson and Johansson (1997) find that the lives of forty 70-year-olds are equivalent to that of one 30-year-old, while the corresponding figure was around 2.5 in the Johansson-Stenman and Martinsson (2008) study. While both studies find that the relative value of a saved life decreases with age, Cropper, Aydede and Portney (1994) found that the utility attached to saving an anonymous life is a hump-shaped function of the age of the person saved. They find that saving the lives of eight, eleven, and seven 60-year-olds was considered equivalent to saving the life of one 20-year-old, one 30-year-old, and one 40-year-old, respectively. Estimates of the willingness to pay for risk reductions and VSL that are based on the age of the subject in stated choice experiments or in revealed preference studies typically reveal relatively higher values from the middle-aged respondents and lower values from the younger and elderly ones (e.g. Evans and Smith 2006; Aldy and Viscusi 2007; Krupnick et al. 2002; Alberini et al. 2004).

While there is a substantial literature on the value of statistical life, little work has been done on the differences in priorities for avoiding fatal injuries and severe injuries. In Europe the relation between the officially used values for values of statistical lives and the values for a severe injury in the transport sector varies somewhat between countries. Results from stated preference studies in countries other than Sweden have derived values between 6.7 and 11.1 (Heatco 2005). For

example, in Sweden the official relation in the transport sector is 6, based on results from Persson, Norinder and Svensson (1995) and Persson (2004). Soby, Ball and Ives (1993) reported, based on four studies in the United Kingdom and the USA, that a fatal injury was worth about 4 times a severe injury, while one study found the relation to be as high as 25.

Mixed results have also been found from studies that have compared the relationship between the context of risk and the willingness to pay (WTP) to reduce or avoid the risk (Carlsson, Johansson-Stenman and Martinsson 2004; Carlsson, Daruvala and Jaldell 2010b; Chilton et al. 2002; Jones-Lee and Loomes 1995; Savage 1993; Viscusi and Aldy 2003). For example, in the transport sector, Jones-Lee and Loomes (1995) found that the WTP for the reduction of risk for the London Underground Railway is 50% higher than that for road accidents, while Viscusi and Aldy (2003) found no differences between the WTP to reduce cancer risks and traffic risks in their review of market estimates. Chilton et al. (2002) studied individuals' preferences for safety programs reducing the number of deaths in four contexts: railways, domestic fires, fires in public places, and roads, and found small differences between the contexts.

The main result from the present study is that we find only minor differences between the priorities of administrators and the general public. When choosing between reducing the risk of many small or one large accident, the most common response from the general public is that they prefer avoiding many small accidents rather than one large accident, while among the administrators there is almost an equal split between the two options. Further, a smaller proportion of administrators than the public chose the option where the two projects were equivalent.

When choosing between projects with different effects on the actual and perceived risks, a large majority of both the general public and administrators chose to give priority to the actual number of lives. However, in one of the choice alternatives, as many as one-third of the administrators thought it was acceptable to trade-off actual lives for decreasing the public's perceived risk.

Regarding the third issue concerning age, both the general public and administrators on average prioritize younger age groups over older ones.<sup>2</sup> For fatality outcomes, the public values the lives of children 1.4 times more than the lives of 40-year-olds and 3.3 times more than the lives of 70-year-olds. This is not statistically significantly different from the administrators' valuation where children's lives are valued 1.8 times more than the lives of 40-year-olds, and 2.9 times more than 70-year-olds, but the figures are lower than ratios used in Europe. We also estimate the marginal rate of substitution (MRS) between lives and serious injuries to be approximately 3.5 for the general public and for most cases this is not statistically significantly different from the administrators. Finally we found that the general public is indifferent between saving lives from fire or traffic accidents, while the administrators (mostly working in fire prevention activities) prefer saving lives from fires.

<sup>2</sup> The results from the survey to the general public for issue three is presented in more detail in Carlsson, Daruvala and Jaldell (2010a).

Many people have an attitude of distrust towards politicians and administrators (bureaucrats) responsible for public policy. Part of this distrust could be related to uncertainty about whether administrators serve their own self-interest or act in the interest of the public. On the other hand, it can also be argued that certain policies in fact should be paternalistic and to some extent ignore the preference of the general public (O'Donoghue and Rabin 2003; Johansson-Stenman 2008). However, the results of this study show that there are only minor differences in priority ordering between the public and the administrators.

The rest of the paper is organized as follows. In Section 1 we describe the surveys and the econometric analysis. The results are presented in Section 2, and Section 3 concludes the paper.

## 1 The surveys

In order to learn more about the priorities of the general public and public administrators we constructed two surveys. The first concerned the trade-off between small and large accidents and the trade-off between subjective and objective risks. The second survey was a choice experiment concerning the trade-off between the number of dead and the number of serious injuries at different ages for two accident types. We sent out two surveys to the general public, but because of the limited sample size for administrators a version containing both surveys was sent to them. Thus, the administrator group received a somewhat longer survey than the general public.

### 1.1 Survey 1

In the first survey, respondents were asked to make choices between different projects. Both the general public and administrators were asked to assume that they were decision makers and required to choose which policy they would recommend, i.e. not the policy they preferred as private citizens. In doing so, we believe we may interpret the responses as a reflection of the priorities the respondents wish the decision maker to have.

In the first question, respondents were asked to choose between two projects, both of which resulted in the same total number of saved lives. One of the projects reduced the number of many small accidents, while the other led to the avoidance of one big accident. The scenario and question are presented in Fig. 1.

In the second part of the survey, respondents were asked to choose between projects with different effects on the actual number of lives saved and the general public's perception of the number of lives saved. Again, respondents were asked to make a choice between two projects. Both projects affected fatality risks for a population of 100,000 people. In one case, the general public's perception of the risk is accurate. In the other case, they overestimate the risk. The scenario and questions are given in Fig. 2. below. In the first question, Project A reduces the actual risk from 5 deaths to 1 per 100,000 inhabitants. Project B is less effective and leads to a reduction in actual risk from 5 deaths to 3 per 100,000. However, in Project B the general public perceives the risk reduction to be

Imagine that you are a public decision maker who is required to choose between two projects that will reduce the number of fatal accidents. In Project A, many small accidents, where few people die in each, are avoided. In Project B, one large accident involving many deaths is avoided. In both cases 200 deaths will be avoided. The risk of dying in an accident is the same in both cases; the only difference is the number of accidents avoided—many small, or one large. Both projects cost the same to implement.

Because society's budget for investments in safety is limited, it is not possible to implement both projects and it is necessary to prioritize.

We are interested in how you would choose between different projects if you were a public decision maker. There is no right or wrong answer.

1. Which project would you choose if you were a public decision maker?

|  | Project A | Project B |
|--|-----------|-----------|
| Number of accidents                    | 200       | 1         |
| Number of saved lives on each occasion | 1         | 200       |
| Number of saved lives during a year    | 200       | 200       |

Fig. 1 Scenario and question for small versus large accidents

much greater than it actually is: from 10 to 3 fatalities. In the second question, we keep the figures in Project A unchanged, but now the actual risk reduction in Project B is larger, from 5 to 2 deaths per 100,000, further, the perceived risk reduction is also larger, from 10 to 2 deaths per 100,000.

Again, imagine you are a public decision maker who is required to choose between two projects, both of which will reduce the number of fatal accidents. Your decision will affect a population of 100,000. In one case the public's perception of the fatality risk is correct. In the other case, the public believes that the risk is greater than it actually is.

You may consider two issues when you make your decision: 1. the reduction in the number of fatalities and 2. the sense of security experienced by the public. This sense of security is dependent amongst other things on the public's perception of the size of the risk. You may therefore consider the reduction in both the actual risk and also the reduction of the perceived risk.

In question 6 below, Project A is aimed at reducing an accident risk where the public's perception of risk is the same as the actual risk. If the project is not implemented, then the risk of death is 5 in 100,000. If you choose to implement the project then the risk of death will be 1 in 100,000.

The second project, Project B is aimed at an accident risk where the public believe that the risk is greater than it really is. If the project is not implemented, then the risk of death is 5 in 100 000, but the public believe the risk to be 10 in 100 000. If you choose to implement the project then the risk of death will be 4 in 100 000. The public will then believe the risk to be 4 in 100 000.

Which of the two projects in question 6 would you choose if you were only able to choose one project?

If instead, the public believes that the risk is 20 in 100,000 as is the case in question 7, which of the two projects would you then choose?

6. Which project would you choose if you were a public decision maker in a town with a population of 100,000?

|           | The actual accident risk is reduced | The public perceives the risk reduction |
|-----------|-------------------------------------|---|
| Project A | from 5 deaths to 1 death            | from 5 deaths to 1 death                |
| Project B | from 5 deaths to 3 deaths           | from 10 deaths to 3 deaths              |

7. Which project would you choose if you were a public decision maker in a town with a population of 100 000?

|           | The actual accident risk is reduced | The public perceives the risk reduction |
|-----------|-------------------------------------|---|
| Project A | from 5 deaths to 1 death            | from 5 deaths to 1 death                |
| Project B | from 5 deaths to 3 deaths           | from 20 deaths to 3 deaths              |

Fig. 2 Scenario and question for actual versus perceived risks

**Table 1** Attribute and attribute levels of the choice experiment

| Attributes                         | Attribute levels  |
|------------------------------------|---|
| Accident type                      | (i) Fire, (ii) Traffic  |
| Number of fatalities avoided       | (i) 2, (ii) 4, (iii) 6, (iv) 8                                  |
| Number of serious injuries avoided | (i) 10, (ii) 25, (iii) 40                                       |
| Age of those saved                 | (i) 5–15 years old, (ii) 35–45 years old, (iii) 65–75 years old |

## 1.2 Survey 2

The second survey conducted was a choice experiment, where respondents were asked to choose between different public investment projects. Again, all respondents were asked to answer what they would choose if they were the decision maker. They made six pair-wise choices. Each project was described by four attributes: cause of accident (fire or traffic), number of avoided fatalities, number of avoided serious injuries, and their age groups. The attributes and the possible levels are presented in Table 1.

The choice sets were created using a cyclical design, or a so-called fold-over (Carlsson and Martinsson 2003). First an orthogonal main effects design was generated, consisting of 24 attribute level combinations. Each of these combinations is one alternative in one of the 24 choice sets. The levels of the attributes in the second alternative in a choice set are obtained by adding two levels to each attribute level of the first alternative, and when the highest level is reached, it starts over from the lowest level. The 24 sets were then randomly blocked into four survey versions. An example of a choice situation to the general public is given in Fig. 3.

We observe respondents making a number of choices between different programs. Each program implies a reduction in the number of fatalities and serious injuries avoided for a certain age group and cause of accident. We apply a binary probit model and estimate the influence on their choices of the various attributes; see Carlsson, Daruvala and Jaldell (2010a) and Johansson-Stenman and Martinsson (2008) for details. From this model we estimate the social marginal rate of substitution (SMRS) between different groups and accident types.

*Which project would you choose if you were a decision maker?*

|                                    | Project A         | Project B      |
|------------------------------------|-------------------|----------------|
| Cause of accident                  | Traffic accidents | Fire accidents |
| Number of fatalities avoided       | 8                 | 2              |
| Number of serious injuries avoided | 40                | 10             |
| Age of those affected              | 65-75 years old   | 5-15 years old |

I would choose  Project A  Project B

**Fig. 3** Question for choice between different attributes

## 2 Results

For the general public group, we use survey responses from two mail questionnaires sent out between May and June 2007. The two surveys were a random sample of 1400 and 2600, respectively, consisting of men and women aged 20–75, selected from the Swedish census registry. The respondents received two reminders after the main survey. For the first survey, in total 459 individuals returned the questionnaire (33%), of which 453 were available for analysis due to non-responses to various questions. For the second survey, a total of 901 individuals returned the questionnaire (35%), of which 890 were available for analysis due to non-responses to various questions. For the administrator group, we used survey responses from an internet survey sent out in September 2008 to a random sample of 330 administrators. The administrators were employed in the field of fire and rescue services both at the national level (mostly within the Swedish Rescue Services Agency) and with the local municipality fire and rescue services. Three reminders were sent. In total 194 administrators returned the questionnaire (59%), of which all were available for analysis. The descriptive statistics of the three samples are presented in Table 2.

In both survey versions, the public sample is representative of the Swedish adult population with respect to gender and age, with the exception that we have significantly more respondents older than 60 years. In addition, both samples contain significantly more people with university education.<sup>3</sup> There are obvious differences between the general public and the administrators. A greater proportion of the administrators have a university education, and there are more men among the administrators compared with the general population. This should not be seen as a sample selection problem *per se*, since the sample frames are different.

### 2.1 Large and small accidents

The question here concerned the choice between avoiding one large accident with many deaths, or many smaller accidents with fewer deaths per accident. The total number of lives saved was the same for both projects. The responses regarding the trade-off between large and small accidents are presented in Table 3.

A large fraction of the general public is indifferent to both projects, although the most common response is that avoiding many small accidents is given priority over avoiding one large accident. Thus, we do not find any catastrophe aversion, which is similar to the findings of Slovic, Lichtenstein and Fischhoff (1984), Jones-Lee and Loomes (1995), and Viscusi (2009), but contrary to Hubert, Barny and Moatti (1991) and Iatoka et al. (2006). Among the administrators, there is almost an equal split between those preferring to avoid many small and one large accident, and fewer consider the two projects to be equally good. Using a chi-square test we can reject the

<sup>3</sup> One thousand samples were bootstrapped by randomly drawing observations with replacement as many times as there are observations in the original sample. By using the percentile method and a 95% confidence interval, it can be shown whether the means significantly differ from each other at the 5% significance level.

**Table 2** Descriptive statistics, mean and standard deviation

|                      | General Public  |                 | Administrators |
|----------------------|-----------------|-----------------|----------------|
|                      | Survey 1        | Survey 2        |                |
| Male                 | 0.479 (0.500)   | 0.474 (0.500)   | 0.665 (0.473)  |
| Age in years         | 46.049 (14.987) | 47.172 (15.08)  | 44.49 (11.32)  |
| University education | 0.410 (0.492)   | 0.397 (0.490)   | 0.784 (0.412)  |
| Income               | 30,610 (14,124) | 29,304 (13,885) |                |
| Apartment block      | 0.370 (0.483)   | 0.405 (0.491)   |                |
| Large city           | 0.294 (0.456)   | 0.279 (0.449)   |                |
| Medium sized city    | 0.251 (0.434)   | 0.223 (0.417)   |                |

<sup>a</sup> SEK = Swedish krona; 1 SEK = 0.147 USD, May 2007

**Table 3** Responses to large versus small accidents

|   | General public |           | Administrators |           |
|---|----------------|-----------|----------------|-----------|
|   | Number         | Frequency | Number         | Frequency |
| Project A (Avoiding many small accidents is better) | 200            | 44%       | 76             | 39%       |
| Project B (Avoiding one large accident is better)   | 105            | 23%       | 77             | 40%       |
| Project A and B are equally good                    | 148            | 33%       | 40             | 21%       |

hypothesis of equal distributions ( $p$ -value 0.000). Thus, administrators are more likely to choose the project that will avoid one large accident, and less likely to say that the two projects are equally good.

### 2.2 Actual versus perceived risks

In the second part of the survey, respondents were asked to choose between projects with different effects on the actual and perceived risks. As stated earlier, the actual and perceived risks and risk reductions were the same in Project A, while in Project B the perceived risk and risk reduction was larger than the actual risk reduction. The responses to the two questions are presented in Table 4.

In both questions, a large majority of the general public and administrators chose Project A, thereby giving priority to the actual number of lives saved, although a greater number chose Project B in question 2 where the reduction in subjective risk was greater. In fact, about one-third of the administrators chose Project B in question 2 thereby prioritizing the increase in the public’s sense of safety over actual lives saved. This result is similar to the empirical findings by Breyer (1993), Carlsson,

**Table 4** Responses to the questions on actual versus subjective risk

|            |                                 | General public |           | Administrators |           |
|------------|---------------------------------|----------------|-----------|----------------|-----------|
|            |                                 | Number         | Frequency | Number         | Frequency |
| Question 1 |                                 |                |           |                |           |
| Project A  | Actual: 5 to 1                  | 370            | 85%       | 158            | 83%       |
|            | Subjective: 5 to 1 <sup>a</sup> |                |           |                |           |
| Project B  | Actual: 5 to 3                  | 64             | 15%       | 33             | 17%       |
|            | Subjective: 10 to 3             |                |           |                |           |
| Question 2 |                                 |                |           |                |           |
| Project A  | Actual: 5 to 1                  | 332            | 77%       | 130            | 68%       |
|            | Subjective: 5 to 1              |                |           |                |           |
| Project B  | Actual: 5 to 2                  | 100            | 23%       | 61             | 32%       |
|            | Subjective: 10 to 2             |                |           |                |           |

<sup>a</sup> Actual: Effect on the actual number of lives saved. Subjective: The general public’s perception of the number of lives saved

Johansson-Stenman and Martinsson (2004) and Setbon et al. (2005), and the arguments put forward by Johansson-Stenman (2008) and Salanie and Treich (2009). Using a chi-square test we cannot reject the hypothesis of equal distribution in any of the questions at the 5% level ( $p$ -value for question one = 0.723,  $p$ -value for question two = 0.069).

### 2.3 Saving different groups

The second survey to the general public was a choice experiment, where respondents were asked to choose between different public investment projects. This experiment was the third part of the survey to the administrators. We estimate two separate binary logit models, one for the public, and one for administrators. Since respondents answered several choice sets, the standard errors are corrected for clustering. These are presented in the Appendix. In order to obtain a measure for the difference in prioritization among different groups, we calculate the SMRS between the various groups. The SMRS is calculated as the ratio of coefficients for the two groups in question (Johansson-Stenman and Martinsson 2008). To begin with we estimate the SMRS between different age groups for the number of fatalities and for the number of serious injuries (Table 5).

We find no systematic differences between the general public and administrators with respect to the priority given to saving different age groups. Results where children are valued higher than adults have been found by Johansson-Stenman and Martinsson (2008) and Hammit and Haninger (2010) and in this study we find that on average, both the public and administrators prioritize younger over older age groups. For example, avoiding the fatality of one 40-year-old is equivalent to avoiding the fatalities of 1.43 10-year-olds for the general public, while the corresponding figure for administrators is 1.84. For the general public all the estimates are significantly higher than one, while two out of four estimates for administrators are significantly higher than one. The only case where the MRS for the public and the administrators is significantly different is for a 10-year-old injured person versus a 40-year-old injured person, but the difference is only weakly significant.

**Table 5** Marginal rates of substitution between different age groups for the public and administrators

|   | General public<br>MRS <sup>P</sup> (s.e.) | Administrators<br>MRS <sup>A</sup> (s.e.) | $P$ -value, $t$ -test $H_0$ :<br>MRS <sup>P</sup> = MRS <sup>A</sup> |
|---|---|---|--|
| (10-year-old fatality avoided)/(40-year-old fatality avoided) | 1.431 <sup>a</sup> (0.187)                | 1.839 <sup>a</sup> (0.331)                | 0.283  |
| (10-year-old fatality avoided)/(70-year-old fatality avoided) | 3.308 <sup>a</sup> (0.919)                | 2.894 (0.763)                             | 0.729  |
| (10-year-old injury avoided)/(40-year-old injury avoided)     | 1.273 <sup>a</sup> (0.118)                | 0.949 (0.152)                             | 0.092  |
| (10-year-old injury avoided)/(70-year-old injury avoided)     | 2.818 <sup>a</sup> (0.547)                | 1.752 <sup>a</sup> (0.464)                | 0.137  |

<sup>a</sup> Significantly different from 1 at the 10% level using a  $t$ -test

**Table 6** Marginal rates of substitution between fire and traffic accidents

|  | General public<br>MRS <sup>P</sup> (s.e.) | Administrators<br>MRS <sup>A</sup> (s.e.) | <i>P</i> -value, <i>t</i> -test H <sub>0</sub> :<br>MRS <sup>P</sup> = MRS <sup>A</sup> |
|--|---|---|---|
| (Traffic accident fatality avoided)/(Fire accident fatality avoided) | 1.147 (0.112)                             | 0.764 <sup>a</sup> (0.063)                | 0.003   |
| Traffic accident injury avoided/(Fire accident injury avoided)       | 1.107 (0.079)                             | 1.291 <sup>a</sup> (0.170)                | 0.326   |

<sup>a</sup> Significantly different from 1 at the 10% level using a *t*-test

The next comparison is between traffic and fire accidents. The results are presented in Table 6.

Interestingly, administrators working in the field of fire and rescue services make different trade-offs between avoiding fatalities and serious injuries across contexts. Avoiding a fatality in a traffic accident is equivalent to avoiding fatalities of 0.76 persons in a fire accident, while avoiding one serious injury in a road accident is equivalent to 1.29 serious injuries in fire accidents. Both these estimates are significantly different from one. For the general public, neither of the estimated MRSs is significantly different from one. This result is in line with Cropper, Aydede and Portney (1994), but Carlsson, Daruvala and Jaldell (2010b) on the contrary found that people valued reducing personal risks from traffic accidents higher than those from fire accidents. The estimated public and administrator MRS for avoiding fatalities in traffic and fire accidents are significantly different from each other.

Finally, we consider the respondents’ trade-offs between deaths and serious injuries. We can make these comparisons for the different age groups and for road and fire accidents. The estimates are presented in Table 7.

Again, few significant differences are found between the general public and administrators. The only exception is for 10-year-olds’ deaths and injuries where we estimate the MRS to be about 3.5 for the general public, which is lower than the

**Table 7** Social marginal rates of substitution between injuries and fatalities avoided

|   | General public<br>MRS <sup>P</sup> (s.e.) | Administrators<br>MRS <sup>A</sup> (s.e.) | <i>P</i> -value, <i>t</i> -test H <sub>0</sub> :<br>MRS <sup>P</sup> = MRS <sup>A</sup> |
|---|---|---|---|
| (10-year-old fatality avoided)/(10-year-old injury avoided) | 3.772 <sup>a</sup> (0.443)                | 7.099 (1.290)                             | 0.015   |
| (40-year-old fatality avoided)/(40-year-old injury avoided) | 3.356 <sup>a</sup> (0.608)                | 3.663 <sup>a</sup> (1.020)                | 0.796   |
| (70-year-old fatality avoided)/(70-year-old injury avoided) | 3.213 <sup>a</sup> (1.246)                | 4.298 (1.755)                             | 0.614   |
| (Fire fatality avoided)/(Fire injury avoided)               | 3.404 <sup>a</sup> (0.591)                | 2.881 (0.868)                             | 0.605   |
| (Road fatality avoided)/(Road injury avoided)               | 3.627 <sup>a</sup> (0.605)                | 2.636 <sup>a</sup> (1.939)                | 0.626   |

<sup>a</sup> Significantly different from 6 at the 10% level using a *t*-test

estimate by Persson, Norinder and Svensson (1995) and Persson (2004), and somewhat lower than the values reported by Soby, Ball and Ives (1993).

### 3 Discussion

People have a tendency to distrust politicians and administrators responsible for public policy. Part of this distrust could stem from uncertainty about whether administrators are motivated by their own self-interest or by the interests of the public. Another explanation for this distrust is that politicians and administrators are often considered to be distanced from people in general, creating policies and making decisions that are not in line with the desires of the public. On the other hand, it can also be argued that it is beneficial for certain policies to be paternalistic and to some extent ignore the preference of the general public (O'Donoghue and Rabin 2003; Johansson-Stenman 2008). However, the results of this study show that there are only minor differences in priority ordering between the public and the administrators.

Are our results using a survey of public administrators and not of publicly elected decision makers relevant for the question of how public decisions are being made? We believe they are. Firstly, Sweden has a decentralized government system with self-governing authorities led by non-elected civil servants both nationally and locally. Secondly, public administrators can highly influence and affect the decisions taken by the elected decision makers, and thirdly, even if protection against accidents is an important area it is rarely an important question in general elections.

The results show that the general public and administrators have fairly similar views with regard to their priorities for different aspects of risk. We found no major differences in terms of priorities between deaths and serious injuries or between different age groups. One exception was that officers working in the field of protection against accidents (mainly from the Swedish Rescue Services Agency and fire and rescue services of the Swedish municipalities) gave priority to saving lives in fires over those saved in road accidents. Another difference is the choice between avoiding one large or many smaller accidents where the administrators have a different priority order than the public. Among the administrators, there is almost an equal split between preferring to avoid many small accidents and one large accident, and fewer think that the two projects are equally good, while a large fraction of the general public thinks the two projects are equally good, even if the most common response is that many small accidents should be avoided instead of one large accident.

Our results are not in line with a number of previous studies investigating differences between the public and decision makers. Carlsson, Kataria and Lampi (2011) found that EPA administrators and the general public make different priorities with respect to environmental policies. However, in their study the general public was asked to respond as citizens and not as decision makers. The same was done in, for example, Colombo et al. (2009) and Alberini, Longo and Riganti (2006). However, in these studies, the decision makers did not respond to the same type of study. Thus, the advantage with the present study is that we use exactly the same elicitation method

for the two groups, and ask them to respond under the same circumstances. Although the results are contextual it is still interesting that in the area of public policy regarding risk, decision makers and the general public would on average make the same decisions.

## Appendix

**Table 8** Logit model results for choice experiment

|   | General public<br>Coefficient ( <i>P</i> -value) | Administrators<br>Coefficient ( <i>P</i> -value) |
|---|--|--|
| Number of fatalities avoided                          | 0.168 (0.000)                                    | 0.483 (0.000)                                    |
| Number of serious injuries avoided                    | 0.045 (0.000)                                    | 0.046 (0.000)                                    |
| Number of fatalities avoided×35–45 year old           | –0.056 (0.004)                                   | –0.185 (0.001)                                   |
| Number of fatalities avoided×60–65 year old           | –0.129 (0.000)                                   | –0.265 (0.000)                                   |
| Number of serious injuries avoided×35–45 year old     | –0.010 (0.007)                                   | 0.003 (0.746)                                    |
| Number of serious injuries avoided×60–65 year old     | –0.032 (0.000)                                   | –0.024 (0.018)                                   |
| Number of fatalities avoided × Traffic accident       | 0.032 (0.137)                                    | –0.157 (0.002)                                   |
| Number of serious injuries avoided × Traffic accident | 0.007 (0.128)                                    | 0.023 (0.029)                                    |
| Number of observations                                | 5312   | 1162   |
| Number of respondents                                 | 890  | 194  |
| Pseudo-R2   | 0.21   | 0.31   |

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