PROJECT N. 037033

EXIOPOL

A NEW ENVIRONMENTAL ACCOUNTING FRAMEWORK USING EXTERNALITY DATA AND INPUT-OUTPUT TOOLS FOR POLICY ANALYSIS

FINAL REPORT ON DEVELOPMENTS IN THE VALUATION OF MORTALITY RISK

Report of the EXIOPOL project

Title	Final report on developments in the valuation of mortality risk
Purpose	
Filename	EXIOPOL_DII.5.b1.doc
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Document history	
Current version.	
Changes to previous version.	
Date	
Status	Final
Target readership	
General readership	
Dissemination level	

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February 2011

Prepared under contract from the European Commission

Contract no 037033-2
Integrated Project in
PRIORITY 6.3 Global Change and Ecosystems
in the 6th EU framework programme

Deliverable title: Final report on developments in the valuation of mortality risk
Deliverable no. : DII.5-b.1
Due date of deliverable: 48
Period covered: from 1st March 2007 to 31st October 2011
Actual submission date: M48
Duration: 4 years
Start date of project: 1st March 2007
Project coordinator: Anil Markandya, BC3
Project coordinator organisation: FEEM

Executive Summary

The benefits of environmental policies and regulations that reduce premature mortality are **typically calculated as the number of Lives saved by the program multiplied by the Value of a Prevented Fatality** (VPF), also known as the Value of a Statistical Life (VSL), a summary measure of the Willingness To Pay for mortality risk reductions. The concept of VPF is generally deemed as the appropriate construct for ex ante policy analyses, because the identities of the people whose lives are saved by the policy are not known. Concerns have been raised about the appropriateness of much policy practice today, which uses compensating wage studies or literature about transportation accidents to calculate the VPF.

Some academic and policy circles propose an alternate approach to valuing the mortality benefits of environmental policies, which requires computing **life expectancy gains (losses) and multiplying them by a metric known as the Value of a Statistical Life Year** (VOLY). Until recently, however, most estimates of the VOLY were derived from estimates of the VSL, which, in turn were taken from labor market studies.

We surveyed individuals in Italy, the UK and the Czech Republic using a standardized questionnaire that investigated the tradeoffs that people make between risk reductions, the timing of the risk reductions, and money. We used conjoint choice experiments. In addition to asking individuals to indicate their preferred between risk reduction profiles, we assigned respondents to different variants of the questionnaire to examine the effect of the cause of death, the risk context (environmental exposures v. others), and any cueing associated with reminding people of the life expectancy gains associated with a mortality risk reduction.

We further incorporated several methodological treatments in our questionnaires, including the use of follow-up conjoint choice questions, and comparisons between internet-administered (CAWI) and computer-assisted in-person interviews (CAPI), which we hope will provide useful information for future research.

Briefly, we find that the VSL (averaged across all variants of the questionnaire within a country) is €2.273 Million in Italy, €0.877 Million in the UK and about €2.183 million in the Czech Republic. However, there are sharp differences in the VSL estimates when we do and we do not inform people about the life expectancy gain implied by the risk reductions shown to them in the conjoint choice questions.

When no such mention is made, the VSL is typically much larger: It is about €5.766 million in Italy, €6.254 in the UK, and €4.252 million in the Czech Republic. These figures are comparable to those estimated in earlier DG-funded projects where respondents examined mortality risk reduction profiles, and are slightly higher than the VPF figures commonly used by DG-Environment in its policy analyses.

When respondents are informed about realistic life expectancy gains associated with the risk reductions they are to value, the VPF is only €0.220 million in Italy and €1.096 million in the Czech Republic. The model does not converge for the UK sample (in other words, we are unable to produce meaningful estimates). When respondents are told about somewhat "inflated" life expectancy gains, the VPFs are €0.562 million (Italy), €0.136 million (UK) and €1.531 million (Czech Republic).

The impact of the life expectancy extension reminders is especially strong in the UK. This effect cannot be attributed to income, since the UK sample was wealthier than the Italy and Czech samples and had the highest VPF when no mention of life expectancy gains was made.

We also find that people have higher VSL values when the risk being reduced are those associated with environmental exposures, and find no difference in the VSL by cause of death. These results are potentially very important for policy purposes. Regarding the effects of environmental risks, we believe that people are willing to pay more to reduce these risks because they perceive them as involuntary. By contrast, others risks such as transportation risks or risks associated with lifestyle are often perceived as voluntary and controllable.

Earlier projects by the very same team funded by DG-Environment suggested that people are willing to pay a premium to reduce their risk of dying of cancer, but this is not the case in the EXIOPOL mortality risk surveys. Perhaps the result is due to the present survey's focus on individual behaviors and risks, whereas we observed a cancer premium in a survey that contrasts individual risks with risk in a public program context. More research, however, is necessary to understand the cancer premium—or lack thereof.

1. Introduction and Motivation.

The benefits of environmental policies and regulations that reduce premature mortality are typically calculated as L× VSL, where L is the number of lives saved by the program and VSL is the Value of a Statistical Life (or Value of a Prevented Fatality), a summary measure of the willingness to pay for mortality risk reductions.

In many countries, including the US and the UK, the VSL used in environmental policy analysis are derived from compensating wage studies or from the literature about transportation accidents. Concerns have been raised about the appropriateness of such practices, because the preferences observed in labor markets are those of workers—not those of the elderly and children, the primary beneficiaries of environmental health protection—and because workplace and transportation risks are very different from the mortality risks associated with environmental exposures (see Robinson, 2007).

To further complicate matters, some academic and policy circles propose an alternate approach to valuing the mortality benefits of environmental policies, which requires computing life expectancy gains (losses) and multiplying them by a metric known as the Value of a Statistical Life Year (VOLY). Until recently, however, most estimates of the VOLY were derived from estimates of the VSL, which, in turn were taken from labor market studies (e.g., Moore and Viscusi, 1990; Viscusi, 1993), or stated preference surveys (e.g., Alberini et al., 2006). To our knowledge, Chilton et al. (2004) and the NEEDS project (Desaigues et al., 2010) were the earliest efforts to elicit directly the willingness to pay for a gain in life expectancy, which is then used to obtain an estimate of the VOLY.

Recent studies (summarized in Krupnick, 2007) have found that among the elderly the VSL is not much lower than in the rest of the population. Since the elderly have shorter life expectancies than younger people, and since the life-saving benefits of many environmental policies are assumed to be proportional to baseline risk, finding that the VSL is approximately constant with respect to age is incompatible with a single VOLY regardless of age.

When we began this project, our goal was to elicit the WTP for specified risk reductions, estimate the corresponding VSL, derive the implicit VOLY, and compare the latter with an estimate of the VOLY from a questionnaire that focused directly on gains in life expectancy. During the survey development work, however, it became clear that respondents were unable to grasp the notion of gains in life expectancy correctly, and so we revised our goals. As we explain below, we chose to compare estimates of the VSL obtained when people are reminded about the gains associated with specific reductions in their risk of dying v. a situation with no such reminders. We vary the duration of the risk reductions within and across respondents to see if people are willing to pay a premium for permanent risk reductions.

We elected to use conjoint choice experiments, because they lend themselves to studying how people respond to variations in the attributes of the risks being valued, and because we have used them successfully in previous EC-funded projects.

As per our original plans, we also explore the impact of cause of death on the VSL, and study whether context (environmental exposures v. other) matters. We incorporated several methodological treatments in our questionnaires, including the use of follow-up conjoint choice questions, and comparisons between internet-administered (CAWI) and computer-assisted in-person interviews (CAPI), which we hope will provide useful information for future research.

We conducted our surveys in Italy, the UK and the Czech Republic. We used CAWI in Italy and the UK, and, in separate samples, CAWI and CAPI in the Czech Republic.

Briefly, we find that the VSL (averaged across all variants of the questionnaire within a country) is €2.273 in Italy, €878,000 in the UK and about €2.4 million in the Czech Republic. However, there are sharp differences in the VSL estimates when we do and we do not inform people about the life expectancy gain implied by the risk reductions shown to them in the conjoint choice questions. When no such mention is made, the VSL is typically much larger: It is about €5.869 million in Italy, €6.172 in the UK, and €4.2 million in the Czech Republic. The impact of the life expectancy extension reminders is especially strong in the UK.

We also find that people have higher VSL values when the risk being reduced are those associated with environmental exposures, and find no difference in the VSL by cause of death. Discount rate are extremely low or zero, and while we do not find evidence of a "permanence premium," people do not discount future risk reductions heavily.

The remainder of this document is organized as follows. Section 2 provides background about the VSL. Section 3 describes our valuation approach (conjoint choice experiments). Section 4 describes the study design. Section 5 describes the structure of the questionnaire. Section 6 presents the structure of the questionnaire and section 7 the survey implementation. Section 8 summarizes the data and section 9 presents the econometric estimation results and the resulting VSL figures. Section 10 concludes.

2. What is the VSL?

This section provides the definition of the Value of A Statistical Life (VSL). First, Willingness to Pay (WTP) is defined as the maximum amount that can be subtracted from an individual's income to keep his or her expected utility unchanged. Individuals are assumed to derive well-being, or utility, from the consumption of goods.

To derive the WTP for a risk reduction, let U(y) denote the utility function expressing the level of well-being produced by the level of consumption y when the individual is alive. Further let R denote the risk of dying in the current period, and V(y) the utility of consumption when dead. Expected utility is expressed as EU=(1-R)·U(y)+R·V(y). This expression is simplified to EU=(1-R)·U(y) if it is further assumed that the utility of income is zero when the individual is dead.

The Value of a Statistical Life (VSL) is a summary measure of the WTP for a mortality risk reduction, and a key input into the calculation of the benefits of adaptation policies that save lives. The mortality benefits are computed as VSL×L, where L is the expected number of lives saved by the policy.

The VSL is the marginal value of a reduction in the risk of dying, and is therefore defined as the rate at which the people are prepared to trade off income for risk reduction:

(1) $$VSL = \frac{\partial WTP}{\partial R} ,$$

where R is the risk of dying.[1] The VSL can equivalently be described as the total WTP by a group of N people experiencing a uniform reduction of 1/N in their risk of dying. To illustrate, consider a group of 10,000 individuals, and assume that each of them is willing to pay €30 to reduce his, or her, own risk of dying by 1 in 10,000. The VSL implied by this WTP is €30/0.0001, or €300,000.

The concept of VSL is generally deemed as the appropriate construct for ex ante policy analyses, when the identities of the people whose lives are saved by the policy are not known yet. As shown in the above mentioned example, in practice VSL is computed by first estimating WTP for a specified risk reduction ΔR, and then by dividing WTP by ΔR.

The concept of Value of a Statistical Life Year (VOLY) is related to the VSL. Specifically, assume that a VOLY is constant over the rest of one's remaining lifetime, and let T be the number of expected remaining life years. Then, the VOLY and the VSL are related as follows:

(2) $$VSL = \sum_t^T VOLY \cdot (1+\delta)^{-t} ,$$

[1] In an expected utility framework with expected utility EU=(1-R)·U(y), the VSL can be expressed as VSL=U(y)/[(1-R)·U'(y)].

where δ is an appropriate discount rate. The notion of VOLY is used in policy analyses in addition to or instead of that of VSL, but, depending on the age of the people whose lives are saved by the policy, can offer recommendations in conflict with those obtained by using VSL. Consider for example two alternative public programs, and suppose that both save 100 lives. But suppose that with one, the lives saved are those of young adults, whereas the other saves the lives of the elderly. Then, as long as the VOLY is constant with respect to age, the policy that saves young adults, who have a longer life expectancy, would be concluded to offer greater benefits if the VOLY is used. By contrast, if the VSL is used, and a single figure is applied to people of all ages, the two policies would be concluded to provide the same benefits.

In the absence of direct empirical estimates, the method used to derive VOLYs has been to take a best estimate of the VSL and convert it to a discounted stream of annual life year values over the remaining lifetime of the subject, based on population data on survival probabilities (ExternE, 1999). For acute effects the following relationship was used:

$$VOSL = VOLY_r \cdot \sum_{i=a+1}^{T} {}_aP_i (1+r)^{i-a-1} \tag{3}$$

where a is the age of the person whose VSL is being estimated, ${}_aP_i$ is the conditional probability of survival up to year i having survived to year a, T is the upper age bound, and r is the discount rate.

The following relationship was derived for quantification of the VOLY for chronic effects:

$$VOLY^r_{chronic} = \sum_{i=1}^{i=T} \frac{YOLL_i}{YOLL_{tot}} \cdot \frac{VOLY^r}{(1+r)^{i-1}} \tag{4}$$

where $YOLL_i$ = the number of years of life lost as a result of an increment in the hazard in year I in each future year, and $YOLL_{tot}$ = the total number of years of life lost in the population.

In ExternE (1999) the central estimate of VOLY for acute effects was €0.12 million, whilst for chronic effect it was €0.084 million, using a discount rate of 3%, derived from a VSL of €3.14 million.

3. Valuation Method Used.

Conjoint choice experiments are a survey-based technique used to investigate the tradeoffs that people are prepared to make between different goods or policies (see Bateman et al., 2002). It is a stated-preference technique, in that it relies on individuals saying what they would do under hypothetical circumstances, rather than observing actual behaviors in marketplaces (Alkrisson and Öberg, 2008).

In a typical conjoint choice experiment survey, respondents are shown alternative variants of a good or a policy described by a set of attributes, and are asked to choose their most preferred (Hanley et al., 2001). The alternatives differ from one another in the levels taken by two or more of the attributes. Price is usually one of the attributes, which allows the analyst to estimate the value people ascribe to the good or the monetized benefits of the policy.

The choice responses are assumed to be driven by an underlying random utility model .[2] Alberini et al. (2007) review basic econometric models used with conjoint choice experiments, and Swait (2007) presents more elaborate models that allow for preference heterogeneity (e.g., mixed logit and latent class models).[3]

Since a variety of policies, situations, or goods can potentially be described in a stylized fashion using a set of attributes, conjoint choice experiments have been applied in transportation economics (see Hensher and Rose, 2007), to study the demand for recreation (e.g., Garrod and Willis, 1998; Hanley et al., 2002), to estimate the losses in property values attributed to pollution (Chattopadhyay et al., 2005) or the increase in property values from open space and biodiversity (Earnhart, 2001), to elicit experts' preferences about climate change and its impacts on human health (Alberini et al., 2006), and to estimate the social benefits of soil conservation (Colombo et al., 2006) and the social costs from landfill siting (Sasao, 2004).[4]

One advantage of conjoint choice experiments is that they allow the analyst to study people's responsiveness to goods, levels of environmental quality, or policy offerings that do not currently exist. Another major advantage is that the attributes can be manipulated independently of one another, allowing the analyst to disentangle their effects separately. This is a great advantage when in real life attributes tend to be bundled together.

Conjoint choice experiments are, of course, not exempt from criticism. Concerns have been raised about the sensitivity of results to the specific design and hypothetical alternatives adopted by the researcher (see Spash, 2007), dependence of responses on previous responses (Holmes and Boyle, 2005), perceived complexity of the choice task (Swait and Adamowicz, 2001; Scarpa et al., 2007) and concerns about the hypothetical nature of the experiments (see Diamond and Hausman, 1994).

Conjoint choice experiments were used to value mortality risk reductions in various contexts in Tsuge et al. (2005), Itaoke et al. (2005), Alberini et al. (2007), and Alberini and Scasny (2010a, 2010b). Tonin et al. (2009) used them to value reductions in the risk of developing cancer (whether or not fatal).

4. Experimental Treatments

[2] Most applications to date have adopted indirect utility functions that are linear in the attributes and in residual income. Lusk and Norwood (2005) study the effects of experiment designs and models in the presence of interactions between attributes, and Alberini et al. (2007) adopt an indirect utility function that is non-linear in the coefficients and in the attributes.

[3] See Scarpa and Rose (2008) for an overview and discussion of statistical experiment design concepts—namely, the choice of attribute levels, creation of synthetic alternatives to be examined by the respondents, creation of choice sets for each choice question, and assignment of the respondents to the variant of the questionnaire.

[4] These are selected examples from the environment and planning literature. In the interest of brevity we omit marketing and health applications from this brief review. See Alriksson and Öberg (2008) for numerous references in the environmental area.

Our original goal was to develop and administer a questionnaire with three distinct approaches for valuing mortality risk reductions. Specifically, we wished to work with three independent subsamples of respondents, asking i) the first subsample to value mortality risk reductions, ii) the second to place a monetary value on the gains in life expectancy implicit in such mortality risk reductions, and iii) the third to examine scenarios that elicited WTP for mortality risk reductions, but that reminded them of the corresponding life expectancy gains.

During the questionnaire development work, it became apparent that while most people grasp intuitively the notion of life expectancy at birth, and are capable of identifying factors that potentially influence it (e.g., lifestyle, genetics, access to health care, progress in science and medicine, etc.), it is extremely difficult to convey gains in (remaining) life expectancy.

We discussed options with other researchers in the field that have conducted independent work on this issue, and decided to change the study design accordingly. Specifically, we decided to focus attention on "blips" (instantaneous or short-lived risk reductions) and permanent risk reductions. Both can be delivered by environmental policies and by imposing specific regulations on the power generation. As we discuss in section FILL below (conjoint choice questions), we decided that the duration of the risk reduction should be an attribute of the alternatives in our conjoint choice experiments. We hypothesize that people are willing to pay for permanent risk reductions more than is implied by a sequence of blips, and that policy analyses that use blips-based studies to value permanent risk reductions may be understating the true benefits of such risk reductions.

Regarding life expectancy, we decided to create an experimental treatment that checked how the valuation of mortality risk reduction is affected by reminding people of the (often very short) life expectancy gain associated with it. This treatment (treatment 2 or "LE Reminder" in table 1 below), is comprised of three variants. In the first, no mention of life expectancy gains is made to the respondent. In the second variant, people are told the approximate life expectancy gain corresponding to the mortality risk reduction that appears in each alternative. In the third variant, we present respondents with life expectancy gains that are 3 times as large as those in variant 2 (for any given risk reduction).

We hypothesize, and wish to test empirically, that respondents will value mortality risk reductions more if they are not told about the (often small) associated life expectancy gains associated with them. We also hypothesize that those respondents who receive variant 3 will have higher VSL values that those who receive variant 2.

Respondents are assigned at random to one of these three variants, and so about one-third of the total sample can be expected to receive each variant. It is also clear that this approach tests the contextual information about life expectancy gains using external tests.

There is much discussion in the mortality valuation and psychometric literature about risks that are undertaken voluntarily by individuals (e.g., workplace risks, transportation risks) and involuntary risks (e.g., environmental exposure). For this reason, we devised another treatment, one where respondents are told that the risk reductions to be valued are associated with environmental exposures (or are told nothing at all). This treatment is listed as treatment 3 in table 1 below, and is labeled "environmental exposures." Again, people are randomly assigned to one or the other variant of this treatment, and so we expect roughly 50% of the sample for each.

In the mortality risk valuation literature, recent studies have examined whether the cause of death matters, i.e., the VSLs, all else the same, is different for different causes of death. In this research project, we wish to study such matter, which is potentially important when estimating the benefits of environmental regulations (see Alberini and Scasny, 2010a, 2010b). We decided to assign people at random to three possible causes of death: 1) all causes, 2) cancer, and 3) cardio- and cerebro-vascular and respiratory illnesses. The purpose of including 1) is for comparability with previous research, while 2) and 3) address directly health endpoints typical of air pollution exposures (see US EPA, 1999, and Hurley et al., 2005). We label this treatment "treatment 1" or "cause of death" in table 1 below. People are assigned to each of these variants at random, and so we expect that about one-third of the sample will be valuing each.

Additional treatments included the variant of the conjoint choice experiment question, the phrasing of the choice question, the numbers used in the two housing choice questions of section K, and the numbers used in the question about the intertemporal preference for money in section K2.

5. Our Conjoint Choice Questions.

The alternative in our conjoint choice experiments are defined by four attributes: i) the mortality risk reduction, which is expressed as X in 1000 over a decade, ii) latency, i.e., the number of years from now when the risk reduction begins, iii) whether it's a blip or a permanent risk reduction, and iv) the cost to the respondent, which will be paid every year starting now and for each of the next 10 years.

We selected a total of four possible risk reductions, ranging from 2 to 5 in 1000 over 10 years, which are equivalent to 2-5 in 10,000 per year. Regarding attribute (ii), our blips are risk reductions that last only one decade. Permanent risk reductions take place over the current decade and the next three for respondents aged 40-49 (for a total of four decades), and over the current and two future decades for respondents aged 50-60 (for a total of three decades). By current decade, we mean the one that begins now and lasts for the next 10 years.

The cost amounts were selected to correspond to a wide range of possible VSLs. We chose annual payment for 10 years, rather a one-time payment, because such an extended payment period was judged to be better compatible with the duration of the risk reductions, and because it allowed us to cover a greater range of possible VSL values. Attributes and attribute levels are summarized in table 2.

Our experiment design incorporates a number of restrictions. We wanted our respondents to examine a total of 5 pairs of hypothetical alternatives. We restricted the latency period to be the same across alternative A and B within a pair, but allowed it to vary across pairs shown to the same respondents, and across respondents. We imposed that i) the first two pairs of alternatives should be comprised exclusively of blips, ii) in the third pair of alternatives, both alternative A and alternative B should be posit permanent risk reductions, and iii) the last two pairs of alternatives should pitch a blip against a permanent risk reductions.

To create the final experiment design, we first constructed all possible combinations of the attribute levels that complied with the specified restrictions, excluded those with obviously dominated alternatives (or two identical alternatives), and selected at random among the pairs that "survived" these exclusion criteria. The resulting design consists of 32 sets ("blocks") of five pairs of alternatives. Respondents were assigned at random to one of these 32 variants of the questionnaire.

There were two more treatments that apply to the conjoint choice questions. One was the mention (or lack thereof) of environmental exposures, which, if present, appeared in the screen that introduces the conjoint choice questions.

The second was the actual choice task. For each pair of alternatives, all respondents were asked to indicate which was their most preferred option—alternative A, alternative B, or the status quo (pay nothing, get no risk reduction)?

There was a follow-up question, but this was phrased differently, depending on whether respondent had been assigned to variant 1 or 2 of treatment 8 (see table 1). Respondents assigned to variant 1 were asked to choose which, of the two remaining options, they liked the least. Respondents assigned to variant 2 were to indicate which, of the two remaining options, they considered the next best. It is clear that either of these follow-up questions allow us to obtain the complete ordering over the three options (altenative A, B and the status quo).

6. Structure of the Questionnaire.

The Exiopol mortality risk valuation questionnaire is comprised of 13 sections. In section A, we ask the respondent to indicate which area he or she lives in, and to enter gender and age.

Section B elicits information about the health status of the respondent. It elicits a general health assessment, whether or not the respondent has certain chronic illnesses, and whether he or she was recently hospitalized because of cardiovascular or respiratory ailments, or cancer (which have been linked with air pollution exposures).

The questions in section C aim at establishing whether the respondent has a family history of cardiovascular illnesses or cancer, and/or such illnesses are salient to him because a family member or friend have them.

In section D, we attempt to assess the respondent's grasp of the notion of life expectancy. We first ask him to tell us to what age he expects to live to, and then to tell us how important certain factors (such progress in the field of medicine, accident prevention, genetics, a healthy lifestyle) are in affecting his longevity. We then show life expectancy and the expected remaining life years for people of various ages, and ask the respondent to infer from this chart his own life expectancy. We showed the same chart to all respondents in Italy, the Czech Republic, and the UK.

Life-table life expectancy is one thing. Own life expectancy may be different, based on information available to the respondent about his own health status, genetics, etc. For this reason, we end this section by asking people to tell us whether their own life expectancy is the same as, shorter or longer than the one shown in the chart.

Section E contains a simple probability tutorial. We illustrate the notion of probability by first displaying a dice and all of its six sides. Clearly, the likelihood of any one number is 1/6. We then provide an example with a larger denominator. Specifically, we ask people to imagine that there is a lottery, that 1000 lottery tickets have been sold, and that only one lucky winner will be drawn at random. What is the likelihood of having the winning ticket? It's 1 in 1000. We graphically display this notion using a grid with 1000 white squares. The winning ticket is represented by a blue square.

The health status of a population—we continue—can likewise be represented using probabilities and the same visual aid. We now introduce the notion of probability of dying, show a probability of dying of 5 in 1000 on the grid, and test the respondent's grasp of probability by asking a simple question. Person A has a probability of dying over the next 10 years equal to 5 in 1000. Person B's is 10 in 1000. Which of these two people has a larger probability of dying over the next 10 years?

In addition to grids of squares, we display mortality risks using bar charts. We use this latter representation to show how the risk of dying changes with age. We then ask people to tell us, based on the information displayed on such a bar chart, what the chance of dying is for a person their age.

In section F of the questionnaire we zero in on different causes of death. We start by asking people to tell us which are the most common causes of death for people his age and for 70-year-olds—cardiovascular illnesses, cancer, or road-traffic accidents? Or are they equally common?

Next, we ask respondents to rate the dread that they associate with various causes of death using a scale from 1 to 5, where 1=low or no dread and 5=highest dread, and then ask them to express their agreement or disagreement with various statements about factors that trigger cancer (e.g., exposure to carcinogens, lifestyle) and about the state of knowledge about cancer triggers. This is followed by a similar exercise about cardiovascular illnesses.

Section G focuses on the causes of death studied in this survey, namely all causes, cardiovascular and respiratory causes, and cancer. We provide a simple description of these illnesses, and then show the share of total mortality that is accounted for by each of them in various age groups (starting with the 30-39 age group and until the 70-79 age group). We end this section of the questionnaire by asking people to tell us whether they think that their own risk of dying from each of these causes is the same as the average person, higher or lower.

Section H of the questionnaire explains that it *is* possible to reduce the risk of dying, and that such reductions can be attained through a variety of measures ranging from medical diagnostic tests, car safety equipment, public programs to reduce pollution, etc. This is followed by a discussion of the duration of such risk reductions, which is important because one of the attributes of our conjoint choice questions is the duration of the mortality risk reduction.

We explain that a flu shot, for example, reduce the risk of dying from the flu or complications of the flu only for one year. Next year, one will need another shot designed for a different strain of the flu virus. We emphasize that other measures may reduce risks for longer periods, and then remind the respondent that in the case of the flu shot, the cost is borne in part by the respondent and in part by the health care system. We then provide a simple example of a behavior that reduces the risk of dying—quitting smoking—and ask respondents to tell us how long they think the risk reduction will last.

Section H ends by asking the respondent to tell who should be responsible for reducing one's risk of dying for various causes. Should it be the government? Or the individual?

Section I introduces two types of mortality risk reductions. The first type occurs for a limited period of time (i.e., the current decade), but in future decades mortality risks will not change. The second type takes places in the current and all future decades. Clearly, these are the description of a "blip" and a permanent mortality risk reduction, although we do not use the word "blip" in our questionnaire. We emphasize that both imply gains in life expectancy, and graphically depict the two types of risk reductions using bar charts.

To get the individuals to practice with tradeoffs involving blips and permanent risk reductions, we ask them to consider two alternate risk reductions. One is a blip, and the risk reduction is 5 in 1000 over the next 10 years. The other is permanent, and the risk reduction is in 1 in 1000 per decade for each of the next 4 decades. If respondents do not discount future risks, the two scenarios pitch a total risk reduction of 5 in 1000 over 10 years v. 4 in 1000 per 10 years. If the cost of these risk reductions were the same, which would the respondent prefer?

Section J contains the conjoint choice questions (see section 5 of this report). These are preceded by text that incorporates the desired treatments, by an example, and by a reminder that while all alternatives are hypothetical, we would like the respondent to answer as truthfully as possible and taking his or her budget into account. We also reminded the respondent that the choice questions he was about to answer would always offer an opt-out, which means no risk reduction and no payments. We meant the risk reductions of this questionnaire to be private, and so we further told the respondent that they would apply to him or her only, and to no other family member or person. Finally, we instructed respondents to think of the alternatives on individual basis: the risk reductions and payments would not be cumulated over the course of the questionnaire.

We conclude section J by asking respondents to indicate how important each of the attribute was when answering the conjoint choice questions. The purpose of this question is to identify any instances of so-called "attribute non-attendance" (Campbell et al., 2008). Finally, we inquired as to how the respondent would pay for the proposed risk reductions, and (only for those respondents who picked the "neither" option at least three times) why he or she chose not to reduce risks on several choice occasions.

In section K, we propose yet another way to study whether the context in which the respondent must make mortality risk-money tradeoffs makes a difference. This time, we ask people to choose between homes that, by their very location, carry different additional mortality risks attributable to air pollution exposures but cost different amounts of money. These choice questions, which are phrased differently for homeowners and renters but compare the same risk reductions and annual costs, are preceded by questions about the neighborhood, the respondent's home, its value or monthly rent, and perceptions of air quality.

Section K2 contains one question, which we use to investigate the discount rate that people apply in money now v. money later situations. Finally, section L elicits information about the socioeconomic characteristics of the respondent.

7. Sampling Plan and Survey Implementation

We asked IPSOS, a well-known survey firms headquartered in Paris, to conduct our surveys in eight cities in Italy and eight in the UK using its internet panels in those countries (N=2400 in each). In the Czech Republic, we commissioned a sample of N=2400 CAPI interviews, plus an additional sample of CAWI interviews (N=800). The CAPI interviews should be geographically representative of the entire country, with oversampling for the larger cities, so that the 800 completed questionnaires from these cities could be compared with the CAWI sample, which was also to be drawn from the larger cities in the Czech Republic. The list of cities is displayed in table 3.

Based on earlier experience and on the fact that our conjoint choice questions include delayed risk reductions and risk reductions that span over several decades, we decided to restrict our universe to adults aged 40-60. We asked IPSOS to ensure i) an even number of men and women, ii) that in each country the educational attainment of the respondents mirrored that of the population in that age group, and iii) that in each country 50% of the respondents had income below the population median household income.

We devoted special attention to the sampling plan for the Czech Republic. It was clear that, due to the less extensive penetration of internet in this country, it wouldn't possible to interview 2400 people using CAWI. We therefore decided to use CAWI for one sample (primarily in the larger cities) and CAPI for another independent sample in the Czech Republic. This was done to i) ensure comparability across our three country study populations, ii) identify possible biases due to the mode of interviewing, and iii) identify whether the preferences of residents of urban area (who are presumably more exposed to pollution) are different from those of rural residents.

Accordingly, we decided to interview 800 people living in large and relatively polluted Czech cities using CAWI (as we did in Italy and in the UK). This allows us to compare the results across our three countries, as mentioned in i) above. We chose Prague, Ostrava and Brno, the three largest Czech cities. Less than 20% of the interviews were to be conducted in Pilsen and Liberec, the fourth and fifth largest cities.

For purposes of comparison, we decided that out of our total CAPI sample of 2400 people, 800 would be interviewed in the same cities, so that their responses could be compared to those of the CAWI respondents.

Because we were interested in national representativeness, we also interviewed 1600 respondents who were interviewed at home using CAPI. We cover 14 regions of the Czech Republic, except for Prague and the large cities already covered in the 800 CAPI interviews.

Martin Kryl programmed the survey questionnaire. CAWI pilots were conducted on July 15-16, 2010 in Italy and the UK (N=33 and 35, respectively), and a CAPI pilot was administered in the Czech Republic on July 9-14, 2010 (N=180).

The final survey was in the field on August 25-September 24, 2010 (Italy), August 25-September 23, 2010 (UK), and August 11-September 18, 2010 (Czech Republic). IPSOS officially declared the end of the surveys on Sept. 29, 2010.

8. The Data

A. Characteristics of the Respondents

Table 4 displays the breakdown of the final sample by country and mode of administration of the survey. We obtained a total of 895 CAWI completes in the Czech Republic. The results from these questionnaires will be compared with those from the 2426 CAWI completes in the UK and the 2369 from Italy. In addition, a total of 2367 CAPI interviews were completed in the Czech Republic. These will be compared with the CAWI results from the same country.

Table 5 presents the composition of the sample by gender, and tables 6 and 7 summarize the age of the respondents. These tables suggested that the final samples are consistent with our sampling plans and the instructions we gave the survey firm.

B. Respondent Health and Assessment of Health Risks

Respondents generally rated their health as good. Categories like “very good” and “excellent” were not selected as often. Descriptive statistics about own health assessment are displayed in table 8.

Table 9 reports descriptive statistics about the respondents’ assessment of their baseline risks of dying for various causes of death and salience of these causes of death. Based on these statistics, we expect most people to be familiar with cancer.

In section D, we asked people to rate their own remaining life expectancy compared to the average person their age. As shown in table 10, overall about 44% of the respondents feel that their life expectancy is the same as the average person’s. The remainder is evenly distributed between feeling that it shorter than, and longer than, the average person’s.

C. Probability Comprehension

The questionnaire presented a short probability tutorial and checked if respondents grasped the main concepts. In table 11 we check whether respondents were able to pick the person with the higher probability of dying between person A and person B. The share of the sample that selected the correct answer (person B) is surprisingly consistent across the three countries.

D. Responses to the Conjoint Choice Questions

In table 12 we report the frequency with which the various alternatives were selected in each of the conjoint choice questions (focusing only on the first choice task, namely the most preferred option). It is clear that the most frequently chosen response category is the status quo, which usually account for one-third to about 40% of the responses. The other two options are generally equally represented.

We did not find any particular association between the cause of death that the respondent was to examine in the questionnaire and the probability of selecting any given alternative. However, when we examined the percentages of "status quo" responses in the first conjoint choice task for each pair ("choose the most preferred"), it is clear that they are much higher among those respondents that were provided the reminder about the life expectancy gain implicit in the mortality risk reductions shown in each alternative (see table 13). It is also clear that the share of "status quo" responses is somewhat lower among those respondents who were told more generous life expectancy gains. We examine below how large of an effect that has on the VSL.

Examination of the responses to the conjoint choice questions by mention of the environmental context treatment (shown in table 14) suggests that there is likely to be only a small difference in VSL between those who were and those who were not told that the risk reductions would be addressing environmental exposures.

We also examined the importance given by the respondents to the different attributes of the alternatives they examined in the conjoint choice questions. Information about the responses to these questions is summarized in Figure 1. It is interesting that the cost attribute is the one that receives the highest shares of "very important" responses, followed by the size of the risk reduction. For comparison, the timing of the risk reduction only gets a "very important" rating by only 21% of the respondents.

9. VSL Results

We report estimates of the VSL in table 15 for the pooled data, and tables 16-18 for the individual countries. All estimates of the VSL are in million PPP euro. For simplicity, in this report the analysis is limited to the responses to the first conjoint choice question for each choice task (i.e., which is your most preferred out of A, B or the status quo?).

We base our estimates on the RUM:

(5) $$V = \alpha \cdot \Delta R \cdot e^{-\delta \cdot L} \cdot [1 + e^{-\delta \cdot 10} + e^{-\delta \cdot 20} + e^{-\delta \cdot 30}] + \beta \cdot (y - C) + \varepsilon$$

if the respondent is 50- 60 years old, and on

(6) $$V = \alpha \cdot \Delta R \cdot e^{-\delta \cdot L} \cdot [1 + e^{-\delta \cdot 10} + e^{-\delta \cdot 20} + e^{-\delta \cdot 30} + E^{-\delta \cdot 40}] + \beta \cdot (y - C) + \varepsilon$$

if the respondent is 40-49 years old, where α is the marginal utility of a unit risk reduction, ΔR is the risk reduction per year, ö is the discount rate, β is the marginal utility of income, y is income and C is the payment that must be incurred in the first year. ε is an i.i.d. type I extreme value error term with scale parameter equal to 1. This means that that the appropriate statistical model of the responses is a conditional logit that is non-linear in the parameters.

The VSL is:

(7) $VSL = (\alpha / \beta) \cdot 1000$.

The standard errors around the estimates of the VSL are computed using the delta method.

The results reported in tables 15-18 confirm that the responses to the conjoint choice questions are consistent with the economic paradigm. The marginal value of the risk reductions is always positive and significant, and the marginal utility of income (i.e., the negative of the coefficient on cost, which is what is displayed in tables 15-18) positive and significant. The discount rate is usually small and positive, or negative, but small and statistically insignificant.

The three tables sound common themes. Expressed in PPP euro, the overall VSL is €1.771 million. This "composite" figure reflects the relatively high valuation reported by the Czech (€2.2-2.4 million), the value reported by the Italians (€2.273 million) and the relatively low value suggested by the British (€0.878 million).

Even more important, there is a considerable amount of heterogeneity in the VSL across the treatments. The VSL is highest when people are asked to value risk reductions without receiving any information as to the implied life expectancy gain. When this is the case, the VSL is around €5.2 million for all countries combined, €5.9 million for Italy, and €6.2 million for the UK.

But when people are told about the (short) life expectancy gains associated with such risk reductions, the VSL plummets in all countries, especially the UK, where about 50% of the responses were "the status quo" when the life expectancy reminder was present.

The VSL rises slightly when we provide a reminder of the associated life expectancy gain, and this is an exaggerated version of the true gain.

Finally, the VSL is higher when respondents are told that the reductions would apply to risks associated with environmental exposures. This effect occurs in all of the three countries, and we believe it is likely due to the fact that people feel they have little or no control over environmental exposures.

In table 19 we explore whether the "choose the worst" or "choose the second best" mattered, even though we do not use the additional information about the preferences conveyed by the response to this question. The results reported in this table suggest that the question format made virtually no difference in Italy and the CAPI sample in the Czech Republic. The two VSLs from the CAWI Czech sample differ from one another by half a million euro, but this difference is not statistically significant. By contrast, in the UK the VSL from one of the treatments is twice as large as that from the other.

Finally, in table 20 we examine if the VSL depends on the cause of death. We remind the reader that different subsamples were assigned to variants of the questionnaire that examines only one cause of death, and so for each respondent all conjoint choice questions focused on a single type of risk reduction.

We estimate the following RUM model:

(8) $$V = (\alpha_1 + \alpha_2 \cdot CANC + \alpha_3 \cdot CARDIO) \cdot \Delta R \cdot e^{-\delta \cdot L} \cdot [1 + e^{-\delta \cdot 10} + e^{-\delta \cdot 20} + e^{-\delta \cdot 30} + E^{-\delta \cdot 40}] + \\ + \beta \cdot (y - C) + \varepsilon$$

and so the VSL for all causes is death is $\alpha_1 / \beta * 1000$, that for cancer is $(\alpha_1 + \alpha_2) / \beta * 1000$, and that cardiorespiratory illnesses is $(\alpha_1 + \alpha_3) / \beta * 1000$.

As shown in table 20, the VSL varies little with the cause of death. The differences in VSL across causes are not statistically significant, and while the Italians and the Czech (CAWI sample) indicated a slightly higher VSL for cancer than for the other causes, the British and the Czech (CAPI samples) actually seem to attach a slightly higher value to reductions in the risk of dying for cardiovascular and respiratory causes. However, these differences are small and statistically insignificant. These results are in sharp contrast with our own earlier research (Alberini and Ščasný, 2010a, 2010b), where we found that people had larger VSL values for cancer than for cardiorespiratory causes of death and road-traffic accident fatality risks.

10. Conclusions

We developed a survey questionnaire specifically designed to examine several hypotheses about mortality risk reductions and administered them to independent samples of respondents in Italy, the UK, and the Czech Republic. The valuation task consisted in a series of conjoint choice experiments. Each person was asked to examine 6 pairs of hypothetical risk reduction profiles. For each pair, the respondent was asked to choose the most preferred among profile A, profile B and the status quo (no risk reduction and no payment). In different variants of the questionnaire, we then ask to indicate either the least preferred option or the second best.

Each profile was defined by four attributes: 1) the size of the risk reduction, 2) whether the risk reduction is effective only for this decade or is repeated for a total of 4 (for respondents aged 40-49) or 3 (for respondent aged 50-60), 3) whether it starts right away or is delayed, and 4) the cost, to be paid annually for each of 10 years.

We created and administered several “treatments” to check whether the VSL varies with the cause of death, with information provided to the respondent about the life expectancy gains associated with the mortality risk reduction, and with the explicit statement that the risk reduction in question are associated with environmental exposures. We also included a methodological treatment—whether choosing the least preferred in each choice set or the second best in each choice set makes a difference on the values.

The questionnaire was self-administered via CAWI in Italy and the UK, and via CAWI and CAPI in the Czech Republic. The responses to the conjoint choice questions were reasonable and the VSL values within the range spanned by previous studies.

We found that reminding people of the life expectancy gains implied by a given risk reduction reduces the VSL dramatically. VSL values are around €4-6 million when no such reminders are given, and much lower in the presence of such reminders. We also found that people *are* willing to pay more for reductions in the risk of dying associated with environmental causes. Much to our surprise, there was no statistically discernible difference in the VSL for difference causes of death.

Our design allows us to estimate the discount rate between money now and future risk reductions directly from the responses to the conjoint choice questions. Although the estimates of the discount rate vary somewhat by country and across the subsamples that were assigned different treatments, it seems to safe to conclude that they are low or zero. We did not find evidence of a premium for permanent risk reductions, but by the same token people do not discount the future, or at least they do not discount it heavily.

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Figure 1.

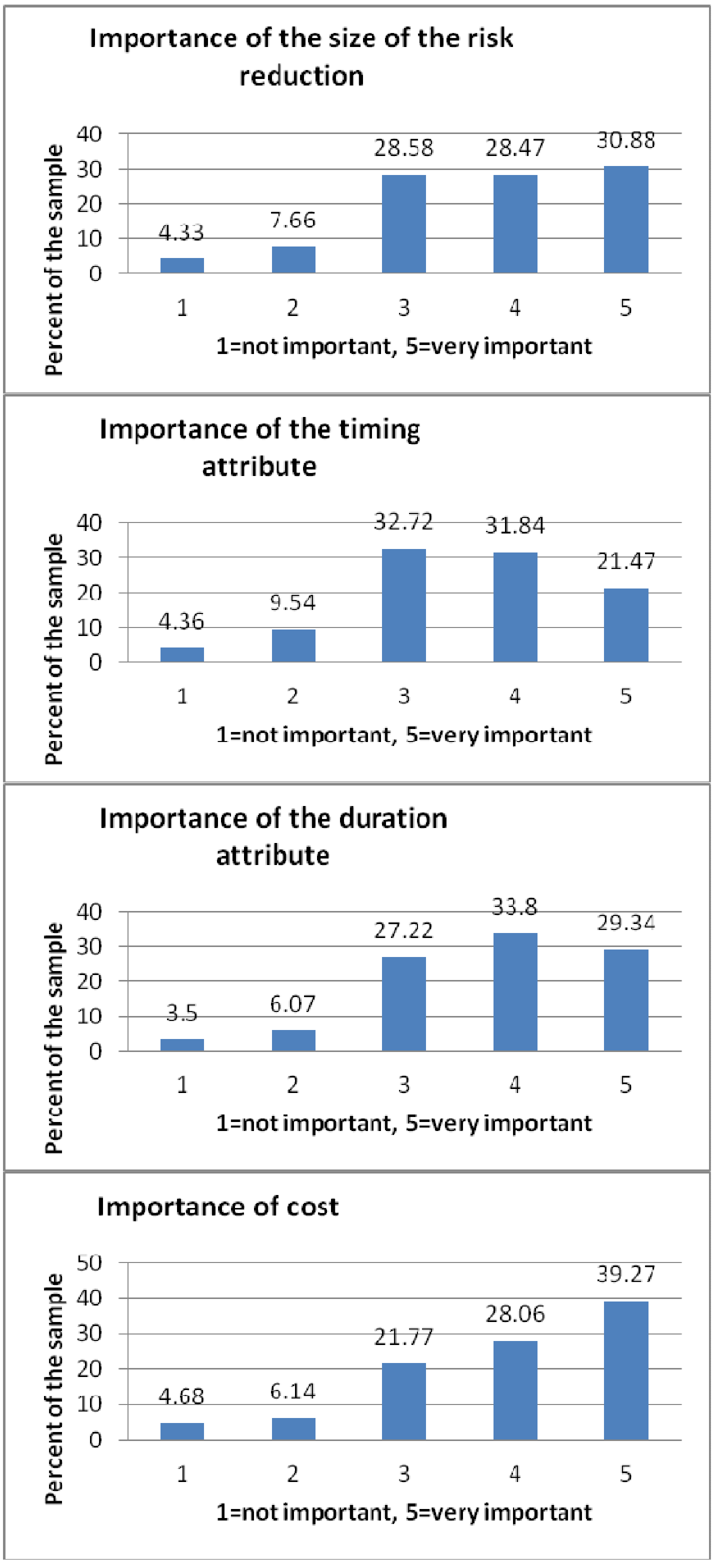
Importance of the size of the risk reduction
Percent of the sample
40
30
20
10
0
4.33
7.66
28.58
28.47
30.88
1
2
3
4
5
1=not important, 5=very important
Importance of the timing attribute
Percent of the sample
40
30
20
10
0
4.36
9.54
32.72
31.84
21.47
1
2
3
4
5
1=not important, 5=very important
Importance of the duration attribute
Percent of the sample
40
30
20
10
0
3.5
6.07
27.22
33.8
29.34
1
2
3
4
5
1=not important, 5=very important
Importance of cost
Percent of the sample
50
40
30
20
10
0
4.68
6.14
21.77
28.06
39.27
1
2
3
4
5
1=not important, 5=very important

Table 1. Experimental treatment used in this study.

experimental treatments					
Treatment number	**Short description**	**Questionnaire section**	**Description and variants**	**Number of variants**	**levels/variants**
treatment 1	**cause of death**	J	each person only considers one cause of death in the conjoint choice questionnaire. Each person is assigned at random to one of three possible causes: 1) all cause of death, 2) cancer, and 3) cardiovascular, cerebrovascular disease and respiratory illnesses	3	1=ALL CAUSES, 2=CARDIOVASCULAR AND RESP., 3=CANCER
treatment 2	**LE REMINDER**	J	either i) risk reduction only, ii) risk reduction plus reminder of expected life time for that person with each alternative, and iii) risk reduction with reminder but the implied LE changes will be much larger	3	1=NO MENTION OF LE CHANGE, 2=MENTION OF LE CHANGE (VALUES CLOSE TO OBJECTIVE VALUES), 3=MENTION OF LE CHANGE (VALUES 3X THOSE IN ITEM 2)
treatment 3	**environmental exposures**	J	context (no mention of environmental causes, environmental causes mentioned)	2	1=NO MENTION, 2=MENTION THAT THE RISK REDUCTION WOULD APPLY TO THE PORTION OF RISK ATTRIBUTABLE TO ENVIRONMENTAL EXPOSURES
treatment 4	**set of conjoint choice questions**	J	which set of conjoint choice questions a respondent is assigned to (see sheet "design for conjoint choice experiments")	32	32
treatment 5	**set for the first choice question of section K**	K	assign the respondent at random to one of these	20	20
treatment 6	**set for the second choice question of section K**	K	assign the respondent at random to one of these (this is independent of all other treatments)	120	120
treatment 7	**discount rate question 1**	K2	assign the respondent at random to one of these	9	9

treatment 8	**choose worst v. choose second-best**	J	half of the sample gets asked to choose the most preferred option, then the least preferred. The other half gets asked to choose the most preferred, and then the second-best. This treatment is new and was introduced only with the final survey.	2	1=choose most preferred, then the least preferred. 2=choose the most preferred, then the second most preferred.

Table 2. Summary of the attributes and attribute levels.

conjoint choice experiments: attributes	
deltarisk	2, 3, 4, and 5 in 1000 per decade
latency	0, 2, 5, 8 years
blip v. permanent	if blip, then the risk reductions lasts only for one decade; if permanent, the risk reduction lasts 40 years (=4 decades) if the respondent is aged 40-49 and 30 years (=3 decades) if the respondent is aged 50-60
cost	annual for the next 10 years, starting this year. The amounts are…..(in euro) 250, 500, 1000, 1800, 3000 euro (Italy) 200, 400, 800, 1400, 2300 pounds (UK) 4300, 8500, 17000, 30000, 50000 CZK (Czech Republic)

Table 3. Sampling plan by country and locale for the CAWI surveys.

UK	N
(1) London + urban area	**850**
(2) Manchester + urban area	**500**
(3) Birmingham + urban area	**400**
(4) Bristol + urban area	**250**
(7) Cardiff + urban area	
(5) Newcastle + urban area	**0**
(6) Edinburgh + urban area	**400**
(8) Glasgow + urban area	

Italy	N
(1) Turin + urban area	**400**
(2) Milan + urban area	**600**
(3) Bologna + urban area	**300**
(4) Florence + urban area	
(5)Naples + urban area	**300**
(6) Rome + urban area	**500**
(7) Bari + urban area	**300**
(8) Palermo + urban area	

Czech Republic	N
Praha	**300**
Brno	**175-200**
Ostrava	**175-200**
Plzeň	**100**
Liberec	**0-50**

sampling population

age range	40-60	*until 61th birthday*

quotas

gender	50%-50%	for each city individually
age	**40-49** (50%) **50-60** (50%)	for each city individually
education	representative of the country population	
income	at least **50%** above country **median**	
size of the residence	representative of the country population	

Table 4. Composition of the sample by country and mode of administration.

Country	type	Freq.	Percent
CZ	CAPI	895	11.11
CZ	CAWI	2367	29.38
UK	CAWI	2426	30.11
Italy	CAWI	2369	29.40
Total		8057	100.00

Table 5. Composition of the sample by country and gender.

	Italy		UK		CZ	
	Freq.	Percent	Freq.	Percent	Freq.	Percent
Male	1,169	49.35	1,239	51.07	1,557	47.73
Female	1,191	50.27	1,180	48.64	1,705	52.27
missing	9	0.38	7	0.29	0	0.00
Total	2,369		2,426		3,262	

Table 6. Age of the respondents by country.

	N	mean	std dev	min	max
ITA	2360	48.73771	5.971482	40	60
UK	2417	49.74969	6.10116	40	60
CZ	3261	49.39712	6.23233	40	60

Table 7. Respondents by age group.

agegroup	cz	En	it	Total
40-49	1,639	1,214	1,309	4,162
50-60	1,622	1,203	1,051	3,876
missing	1	9	9	19
Total	3,262	2,426	2,369	8,057

Table 8. Respondent assessment of own health.

qB_1	cz	En	it	Total
excellent	194	196	72	462
	5.95	8.1	3.05	5.75
very good	496	454	399	1,349
	15.21	18.77	16.91	16.78
good	1,482	800	1,081	3,363
	45.45	33.07	45.82	41.83
fair	826	735	670	2,231
	25.33	30.38	28.4	27.75
poor	263	234	137	634
	8.07	9.67	5.81	7.89
Total	3,261	2,419	2,359	8,039

Table 9. Familiarity with risks and salience.

	pooled	**cz**	**ita**	**uk**
C2. Do you believe that cardiovascular and respiratory illnesses run in your family?	0.34	0.38	0.27	0.34
C3. Do any of your immediate family members (i.e., grandparents, parents, or siblings) have severe chronic cardiovascular and respiratory illnesses or had it in the past?	0.38	0.34	0.32	0.48
C4. Have your wife or husband, a dear friend, or someone who is close to you (but is not blood-related to you) ever had a severe chronic cardiovascular or respiratory illness?	0.31	0.26	0.27	0.42
C5. Do you believe that cancer runs in your family?	0.32	0.41	0.22	0.29
C6. Have any of your immediate family members (i.e., grandparents, parents, or siblings) ever had cancer (a malignant tumor)?	0.49	0.44	0.50	0.55
C7. Have your wife or husband, a dear friend, or someone who is close to you (but is not blood-related to you) ever had cancer (a malignant tumor)?	0.51	0.42	0.54	0.61

Table 10. respondent assessment of how his or her own life expectancy compares to the average person's.

	pooled	**cz**	**ita**	**uk**
1. Shorter	24.62	30.91	18.23	22.39
2. Just about the same	44.47	44.34	41.63	47.42
3. Longer	22.48	16.19	29.08	24.54
4. Don't know	8.42	8.56	11.06	5.66

Table 11. First probability quiz.

qE_1	cz	en	it	Total
missing	2 0.06	4 0.16	12 0.51	18 0.22
person A	549 16.83	322 13.27	369 15.58	1,240 15.39
person B	2,711 83.11	2,100 86.56	1,988 83.92	6,799 84.39
Total	3,262 100	2,426 100	2,369 100	8,057 100

Table 12. Frequency of the response options in the conjoint choice questions.

	best in CJ 1	best in CJ 2	best in CJ 3	best in CJ 4	best in CJ 5
1	2,278	2,305	2,497	2,513	2,222
2	2,735	2,587	2,676	2,534	2,925
3	3,037	3,159	2,877	3,003	2,905
	8,050	8,051	8,050	8,050	8,052

Table 13. Responses to the conjoint choice question by treatment 2.

	1=no mention	2=mention of LE gain	3=mention of LE gain, larger LE gains
most preferred in choice question 1			
1=alt A	33.7	24.01	27.38
2=alt B	38.96	31	32
3=status quo	27.34	45.19	40.29
Total	100	100	100
most preferred in choice question 2			
1=alt A	34.83	24.3	26.97
2=alt B	37.04	28.93	30.6
3=status quo	28.13	46.77	42.43
Total	100	100	100
most preferred in choice question 3			
1=alt A	37.5	25.99	29.79
2=alt B	37.73	30.18	31.98
3=status quo	24.77	43.83	38.23
Total	100	100	100
most preferred in choice question 4			
1=alt A	38	26.7	29.19
2=alt B	37.23	28.09	29.3
3=status quo	24.77	45.21	41.51
Total	100	100	100
most preferred in choice question 5			
1=alt A	34.6	23.2	25.22
2=alt B	41.01	32.34	35.8
3=status quo	24.39	44.46	38.98
Total	100	100	100

Table 14. Responses to the conjoint choice question by treatment 8.

	0=no mention	1=mention of environmental exposures
most preferred in choice question 1		
1=alt A	28.18	28.41
2=alt B	32.32	35.64
3=status quo	39.5	35.94
Total	100	100
most preferred in choice question 2		
1=alt A	27.89	29.38
2=alt B	31.28	32.99
3=status quo	40.84	37.63
Total	100	100
most preferred in choice question 3		
1=alt A	29.87	32.18
2=alt B	33.36	33.13
3=status quo	36.78	34.7
Total	100	100
most preferred in choice question 4		
1=alt A	29.87	32.58
2=alt B	31.4	31.56
3=status quo	38.73	35.87
Total	100	100
most preferred in choice question 5		
1=alt A	27.43	27.76
2=alt B	35.06	37.60
3=status quo	37.51	34.64
Total	100	100

Table 15. Conditional logit model: Results for all countries.*

All countries	ALL		no LE gain reminder		LE reminder==2		LE reminder==3		no envir. Context		envir. Context	
	coeff.	t stat.	coeff.	t stat.	coeff.	t stat.	coeff.	t stat.	coeff.	t stat.	coeff.	t stat.
ALPHA1	0.6088	12.259	1.9424	19.858	0.0301	1.334	0.2924	4.407	0.408	6.35	0.8084	11.139
BETA	-0.0003	-40.178	-0.0004	-25.594	-0.0004	-27.076	-0.0003	-22.792	-0.0003	-27.827	-0.0004	-28.965
DELTA	0.0344	6.151	0.0709	14.66	-0.0578	-2.164	-0.0015	-0.132	0.0143	1.584	0.0485	6.941
N	40183		13100		13594		13489		20170		20013	
VSL (mill euro)	1.771		5.178		0.085		0.874		1.213		2.306	
std error (mill euro)	0.125		0.229		0.062		0.178		0.169		0.177	

Table 16. Conditional logit model: Results for Italy.*

Italy	ALL		no LE gain reminder		LE reminder==2		LE reminder==3		no envir. Context		envir. Context	
	coeff.	t stat.	coeff.	t stat.	coeff.	t stat.	coeff.	t stat.	coeff.	t stat.	coeff.	t stat.
ALPHA1	0.6016	7.197	1.8618	10.572	0.1096	1.456	0.2437	2.313	0.5126	4.307	0.694	5.896
BETA	-0.0003	-17.504	-0.0003	-12.117	-0.0003	-10.665	-0.0002	-9.315	-0.0003	-12.62	-0.0003	-12.137
DELTA	0.0286	3.317	0.0609	7.51	-0.0216	-0.765	0.000	0.001	0.0248	1.741	0.0314	2.973
N	11794		3875		3944		3975		6090		5704	
VSL (mill euro)	2.273		5.869		0.415		1.027		1.918		2.642	
std error (mill euro)	0.264		0.504		0.265		0.391		0.380		0.368	

Table 17. Conditional logit model: Results for the UK.*

UK	ALL		no LE gain reminder		LE reminder==2		LE reminder==3		no envir. Context		envir. Context	
	coeff.	t stat.	coeff.	t stat.	coeff.	t stat.	coeff.	t stat.	coeff.	t stat.	coeff.	t stat.
ALPHA1	0.2789	4.466	2.1657	12.207	does	not	0.0649	1.489			0.4995	4.368
BETA	-0.0003	-20.936	-0.0004	-13.253	converge	after	-0.0003	-13.986			-0.0003	-15.717
DELTA	-0.0111	-1.071	0.06	8.644	1000	iterations	-0.063	-2.644			0.0144	1.11
									0.1485	2.498		
N	12084		3900				4079		-0.0003	-14.589	6224	
VSL (mill euro)	0.878		6.172				0.195		-0.0353	-2.209	1.460	
std error (mill euro)	0.175		0.468				0.125		0.181		0.290	

*: All results based on using only the response to the first conjoint choice question for each A-B-status quo choice task.

Table 18. Conditional logit model: Results for the Czech Republic.*

CZ--CAWI	ALL		no LE gain reminder		LE reminder==2		LE reminder==3		no envir. Context		envir. Context	
	coeff.	t stat.	coeff.	t stat.	coeff.	t stat.	coeff.	t stat.	coeff.	t stat.	coeff.	t stat.
ALPHA1	0.937	5.412	2.1297	6.715	0.4303	1.336	0.5803	2.297	1.0969	4.243	0.8006	3.432
BETA	-0.0004	-15.97	-0.0005	-10.486	-0.0004	-9.783	-0.0004	-8.855	-0.0005	-12.491	-0.0004	-10.128
DELTA	0.0831	3.857	0.1014	5.509	0.4996	0.615	0.0258	0.955	0.0749	2.953	0.0944	2.513
N	4470		1385		1605		1480		2140		2330	
VSL (mill euro)	2.183		4.219		1.096		1.4056	2.1836	2.201		2.173	
std error (mill euro)	0.354		0.520		0.776		0.535	0.3546	0.453		0.557	

CZ--CAPI	ALL		no LE gain reminder		LE reminder==2		LE reminder==3		no envir. Context		envir. Context	
	coeff.	t stat.	coeff.	t stat.	coeff.	t stat.	coeff.	t stat.	coeff.	t stat.	coeff.	t stat.
ALPHA1	1.0435	9.858	1.8199	10.044	0.636	2.868	0.8423	4.888	0.6905	4.591	1.3903	9.223
BETA	-0.0004	-26.394	-0.0004	-15.344	-0.0004	-12.812	-0.0004	-15.522	-0.0004	-18.068	-0.0005	-19.294
DELTA	0.0787	6.879	0.0901	7.715	0.2391	1.028	0.0484	2.91	0.0571	2.783	0.0893	6.886
N	11835		3940		3940		3955		6080		5755	
VSL (mill euro)	2.425		4.295		1.495		1.924		1.687		3.066	
std error (mill euro)	0.215		0.366		0.519		0.343		0.332		0.284	

*: All results based on using only the response to the first conjoint choice question for each A-B-status quo choice task.

Table 19. Conditional logit model: Does the format of the follow-up conjoint choice question matter? SecJ=0: choose best, then worst. SecJ=1: choose best, then second best.*

	ITALY				UK			
	secJ=0		secJ=1		secJ=0		secJ=1	
	coeff.	t stat.	coeff.	t stat.	coeff.	t stat.	coeff.	t stat.
ALPHA1	0.6493	5.474	0.5526	4.693	0.3505	3.682	0.2129	2.692
BETA	-0.0003	-13.226	-0.0002	-11.516	-0.0003	-15.304	-0.0003	-14.389
DELTA	0.0318	2.721	0.0251	1.957	-0.0046	-0.35	-0.0187	-1.144
N	5994		5800		6060		6024	
VSL (mill euro)	2.295		2.244		1.060		0.698	
std error (mill euro)	0.351		0.399		0.253		0.234	

	CZ--CAWI				CZ--CAPI			
	secJ=0		secJ=1		secJ=0		secJ=1	
	coeff.	t stat.	coeff.	t stat.	coeff.	t stat.	coeff.	t stat.
ALPHA1	1.0852	4.417	0.7881	3.317	0.9818	6.758	1.1146	7.236
BETA	-0.0004	-11.695	-0.0004	-10.878	-0.0004	-17.913	-0.0004	-19.402
DELTA	0.0943	3.196	0.0706	2.324	0.0729	4.772	0.0857	4.974
N	2260		2210		5775		6060	
VSL (mill euro)	2.443		1.904		2.373		2.495	
std error (mill euro)	0.483		0.504		0.304		0.305	

*: All results based on using only the response to the first conjoint choice question for each A-B-status quo choice task.

Table 20. Conditional logit model. Effect of cause of death.*

	ITALY		UK		CZ--CAWI		CZ--CAPI	
	coeff.	t. stat	coeff.	t. stat	coeff.	t. stat	coeff.	t. stat
ALPHA1	0.5864	6.352	0.263	4.297	1.1772	5.198	0.8714	7.206
ALPHA2	0.0224	0.286	0.0195	0.39	-0.4379	-2.13	0.3071	2.414
ALPHA3	0.0268	0.342	0.1587	2.556	-0.3529	-1.721	0.2168	1.728
BETA	-0.0003	-17.507	-0.0003	-21.307	-0.0004	-16.017	-0.0004	-26.404
DELTA	0.0288	3.327	-0.0034	-0.334	0.078	3.825	0.079	6.924
N	11794		12084		4470		11835	
log L	-12778.0		-12976.5		-4735.3		-12561.0	
	VSL (mill euro)	std. err. (mill.euro)	VSL (mill euro)	std. err. (mill.euro)	VSL (mill euro)	std. err. (mill.euro)	VSL (mill euro)	std. err. (mill.euro)
all causes	2.215	0.304	0.818	0.173	2.734	0.481	2.024	0.257
cancer	2.300	0.317	0.878	0.179	1.717	0.437	2.737	0.292
cardioresp.	2.317	0.324	1.311	0.260	1.915	0.418	2.527	0.270

*: All results based on using only the response to the first conjoint choice question for each A-B-status quo choice task.