Willingness to Pay to Reduce Mortality Risks: Evidence from a Three-Country Contingent Valuation Study

Anna Alberini, Alistair Hunt and Anil Markandya

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Anna Alberini, *University of Maryland and Fondazione Eni Enrico Mattei*
Alistair Hunt, *University of Bath*
Anil Markandya, *The World Bank, University of Bath and Fondazione Eni Enrico Mattei*

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Summary

Valuing a change in the risk of death is a key input into the calculation of the benefits of environmental policies that save lives. Typically such risks are monetized using the Value of a Statistical Life (VSL). Because the majority of the lives saved by environmental policies are those of older persons, there has been much recent debate about whether the VSL should be lower for the elderly to reflect their fewer remaining life years. We conducted a contingent valuation survey in the UK, Italy and France designed to answer this question. The survey was administered in these three countries following a standardized protocol. Persons of age 40 and older were asked questions about their willingness to pay for a specified risk reduction. We use their responses to these questions to estimate the willingness to pay (WTP) for such a risk reduction and VSL. Our results suggest that the VSL ranges between €1.052 and €2.258 million. The VSL is not significantly lower for older persons, but is higher for persons who have been admitted to the hospital or emergency room for cardiovascular and respiratory problems. These results suggest that there is no evidence supporting that VSL should be adjusted to reflect the age of the beneficiaries of environmental policy. They are also partly inconsistent with the QALY-based practice of imputing lower values for persons with a compromised health status. We also find that income is positively and significantly associated with WTP. The income elasticities of the WTP increase gradually with income levels and are typically between 0.15 and 0.5 for current income levels in EU countries. We use the responses to the WTP questions to estimate the value of an extension in remaining life expectancy. We find that the value of a month's extension in life expectancy *increases* with age and with serious cardiovascular and respiratory illnesses experienced by the respondent. The value of a loss of one year's life expectancy is between €55,000 and €142,000.

Keywords: Value of a statistical life, Willingness to pay, Life expectancy, Risk reduction, Contingent valuation
JEL Classification: H41, H51, I18, I31, J17

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Address for correspondence:
Anna Alberini
Department of Agricultural and Resource Economics - University of Maryland
2200 Symons Hall
College Park, MD 20742
USA
Phone: 001 301 405-1267
Fax: 001 301 314-9091
E-mail: aalberini@arec.umd.edu

I. Introduction.

The Value of a Statistical Life (VSL) is a key input into the calculation of the benefits of environmental policies that save lives. In recent retrospective analyses of air quality regulations, the US Environmental Protection Agency, for example, used a VSL of $6.1 million (€5.6 million).[1] DG Environment, on its part, recommends a central VSL figure of €1 million.[2]

Because the majority of the lives saved by environmental policies are those of older persons, there has been much recent debate about whether the VSL should be lower for the elderly to reflect their fewer remaining life years. Likewise, it is sometimes speculated that people in poor health or with chronic conditions may be willing to pay less for a reduction in their risk of dying (see Alberini et al., 2004).

DG Environment does indeed currently adjust its VSL for age, using a correction factor of 0.7 for older people, and for cancer-related deaths. In practice, DG Environment faces yet another challenge—namely, whether the VSL should be adjusted to reflect the different incomes of the various populations with the European Union. Finally, some observers have recently questioned the usefulness of the concept of VSL when changes in pollution exposures are sustained over a long period of time, and have argued that the correct interpretation of the effects of these exposures is that they cause changes in the life expectancies of the exposed populations (Markandya and Rabl, 2004).

In this paper, we ask three related research questions. First, should the VSL used in environmental policies analyses be adjusted for the age and the health of the persons

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[1] The conversion into euro is based on the exchange rate of $1= €0.918

[2] The recommendations for the EU can be found at http://europa.eu.int/comm/environment/enveco/others/recommended_interim_values.pdf.

whose lives are saved? Second, should the VSL figure(s) reflect the income of the different populations within the European Union? Third, what is the value of a life expectancy extension?

The appropriate way to answer the question whether VSL should be adjusted for the age of the individual is to ask people of various ages—including elderly persons—to report their willingness to pay (WTP) for a reduction in their risk of dying.[3] If the sample includes persons in poor physical health as well as healthy individuals, it is possible to find out whether the former hold different WTP values for reductions in mortality risks.

In this paper, we report the results of a contingent valuation survey that was conceived to address these issues. The survey questionnaire was self-administered, using a computer, by individuals aged between 40-75 in these three countries. Respondents were to value a risk reduction of 5 in 1000 to be experienced over the next 10 years (beginning immediately) by answering dichotomous-choice questions with dichotomous-choice follow-ups. Pollution was not mentioned to the respondents in this survey.

The survey was conducted in three EU countries—the UK, France and Italy—following standardized protocols. This allows us to explore the issue whether WTP varies with income and across different EU populations, which is our second research question.

We use the responses to the WTP questions about the immediate risk reduction to estimate the VSL. We show that the VSL are within (and on the low end of) the range recommended by DG Environment, but do not find any evidence that WTP (and hence VSL) is lower for older persons. Willingness to pay is higher among those respondents

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[3] Earlier studies that have produced estimates of the VSL, such as compensating wage studies, are ill-suited to answer these questions.

[4] Respondents were also asked to report information about their WTP for a 1 in 1000 risk reduction, and about a risk reduction of 5 in 1000 beginning at age 70. Should we say why we are not making use of these results?

who have been admitted to the hospital or has visited an emergency room for cardiovascular or respiratory illnesses in the last five years. Regarding the effect of cancer, people who have or have had cancer are willing to pay more to reduce their risk of dying, but this positive association is not statistically significant, a result we attribute to the small number of respondents with such an ailment. Taken together, the latter two findings are in contrast to Quality-Adjusted Life-Years (QALY) approaches to value environmental policies that save lives.[5]

To answer our third research question, we use the responses to the WTP questions, combined with the extension in life expectancy implied by the 5 in 1000 risk reduction, to estimate the value of a gain in remaining life expectancy, another key input in environmental policy analyses.

We value changes in life expectancy using two alternative approaches. Under the first approach, we regress WTP on the gain in life expectancy implied by the 5 in 1000 risk reduction and based on population life-tables (i.e., the baseline life expectancy of the persons in our samples is the population's life expectancy based on age and gender). Under the second approach, the gain in life expectancy is with respect to the respondent's own estimate of life expectancy. Estimates of the value of a gain in life expectancy of one year are between €52,000 and €148,000, a range which encompasses the estimates used by European researchers in valuing chronic mortality (Friedrich and Bickel, 2001).

The remainder of this paper is organized as follows. Section II describes the structure of the questionnaire and the administration of the survey. Section III presents

[5] The Quality-Adjusted Life-Years (QALY) approach is sometimes used by government agencies and in medical decision-making to examine the effect of policies that save lives. Briefly, the QALY approach weights the remaining life years implied by a policy or health care intervention by an index of the quality of life during those years. The index ranges between 0 and 1, where 1 means perfect health, and 0 means

the data. Section IV presents the statistical models of WTP, regression results, and estimates of WTP and VSL. In section V, we discuss the effect of income on the VSL, and in section VI we examine the effects of age and health status. In section VII we convert risk reductions into gains in remaining life expectancy, and estimate models of WTP for such gains. Section VIII concludes.

II. Structure of the Questionnaire and Survey Administration

In 2002, we conducted a survey in three European countries—the UK, France and Italy—to elicit willingness to pay for a reduction in one's own risk of dying. Our questionnaire was self-administered by the respondents using the computer, and was virtually identical—save for the language and other minor differences—to the questionnaire used by Krupnick et al. (2002) and Alberini et al. (2004) in similar studies in Canada and the US, respectively.

The questionnaire began with asking questions about the respondent's own health and the health of his or family members. It then presented a 'tutorial' about probabilities, focusing on the chance of dying. A grid of squares was used as a visual aid to depict the risks of dying. Respondents were shown a grid of 1000 squares, with red squares representing the chance of dying. Risk comprehension was tested by asking people to recognize which of two persons had the higher risk of dying. We term this quiz the probability test. Respondents were subsequently asked to tell us which of these two persons they would prefer to be.

Respondents were shown their baseline risk of death over the next 10 years, which varies with gender and age, and were subsequently asked to report information

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death. (Some health conditions may be considered less desirable than death, and are given negative index about their WTP for (i) a risk reduction of 5 in 1000, to be incurred over the next 10 years, (ii) a risk reduction of 1 in 1000, to be incurred over the next 10 years, with respect to the baseline, and (iii) a risk reduction of 5 in 1000, which would begin at age 70 and be spread over the next 10 years. The payment, respondents were told, would have to be made every year, and would begin immediately. We employed dichotomous choice payment questions and follow-ups. Although respondents were asked to value three risk reductions, in this paper attention is restricted to WTP for (i).[6]

In the UK and France, respondents were contacted in the Bath and Strasbourg areas respectively, using a mix of random digit dialing, in-street intercept, and "snowballing," a recruiting technique where respondents are asked to submit names of acquaintances. In Italy, respondents were recruited among participants in computer classes at FEEM's Multimedia Libraries in Venice, Milan, Turin and Genoa, and from workers of the Milan area.

In Italy and the UK, people were asked to value risk reductions (i), (ii), and (iii) exactly in the order listed above. We term this the "wave 1" design. In the France study, respondents were randomly assigned to one of two possible subsamples. Subsample I received the "wave 1" design, and subsample II received the "wave 2" design, which switches the order of risk reductions (i) and (ii). Study designs and sample sizes for each country are summarized in table 1.

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scores.)

[6] The analyses of the WTP for the 5 in 1000 and the 1 in 1000 risk reductions are reported in Alberini (2003), who shows that WTP does increase systematically with the size of the risk reduction. We focus on the WTP responses for the 5 in 1000 risk reduction because this is, by construction, free of order bias (see Bateman et al., 2003).

The sampling plan restricted attention to persons older than 40 years of age and required at least one-third of the sample to be comprised of persons of age 60 and older.[7] The sampling plan also called for an approximately equal number of men and women.

Table 1. Sample size and experiment design.

	UK	Italy	France
N	330	292	299
Locale of the Study	Bath	Venice, Genoa, Milan and Turin	Strasbourg
Experimental Design	Wave 1	Wave 1	Wave 1 and wave 2

III. The Data

Given the recruiting techniques and the locales at which the survey was administered, we cannot make any claims that our samples are representative of the population of the respective country. Our first order of business is, therefore, to examine the characteristics of our respondents. Descriptive statistics of the respondents are reported in table 2.

The average age of the respondent is 55 to 58, depending on the country, as is consistent with the desired sampling frame. The samples are relatively well balanced in terms of gender, with only a slight prevalence of women over men, and the average number of years of schooling ranges from 11 (for the French study) to about 14 (for the UK sample). The average annual household income ranges from €32,000 to roughly €40,000.

[7] Early development work found that younger individuals found it difficult to focus on their risk of dying and on changes in their own risk of death, possibly because few of them had experienced a death in the family or among their friends. This difficulty was further complicated by the fact that these younger

Table 2. Descriptive Statistics of the Respondents. Sample averages for selected variables.

	UK	Italy	France
Socio-demographics			
Age	58.03	57.04	55.35
Male	49.39%	48.63%	47.29%
Income in EUR Mean Median	 40,096 38,690	 40,115 25,000	 32,186 32,012
Education (years of schooling)	14.10	12.99	11.04
Health Status			
Rates own health as good or excellent relative to others same age (dummy)	0.61	0.38	0.42
High blood pressure or other cardiovascular illness, or chronic respiratory illness, or stroke (dummy)	0.43	0.39	0.45
Has been to the hospital or emergency room in the last 5 years for a cardiovascular or respiratory illness (dummy)	0.06	0.11	0.11

A check of how representative the sample data were to national data was made for the UK and (partly) for Italy. For the UK, the sample region data are broadly similar to the national average. Mean income is 99 percent and education 93 percent of the national average. Cardiovascular disease incidence is lower–at 88 percent of the national average while respiratory disease incidence is 4 percent higher. In Italy comparable income data were not available but national average education levels for 35-64 year olds is 9.35 years,

people's risks of dying were very small and almost impossible to represent graphically using our grid of squares.

compared with 12.99 years in the sample. Hence in Italy's case, the sample is considerably more educated than the national average (about 40 percent more).

Table 2 also reports descriptive statistics about the health status of the respondents, showing that the percentage of the sample that rated their health as good or excellent relative to others of the same age varies dramatically across the three countries. In Italy, only 38 percent of the respondents described their health as very good or excellent, against 61 percent of the British sample. When asked directly about specific cardiovascular and chronic respiratory illness, or stroke, however, the Italian sample fared well relative to their UK and French counterparts.[8] Between 6 and 11 percent of the respondents reported having been admitted to the hospital or having visited the emergency room for a cardiovascular or respiratory illness over the last 5 years.

In contingent valuation surveys about one's own risk of dying, it is important to make sure that respondents grasp the concept of risk. The survey questionnaire asked two questions to assess risk comprehension. The first was a quiz that asked respondents which of two people had the greater chance of dying—the person with 5 in 1000 risk of dying, or the person with the 10 in 1000 risk of dying. The second question asked respondent which of two people they would rather be. We term the latter the probability choice question.

Table 3 displays the percentages of respondents who failed the probability test and choice questions. These percentages are similar across the three countries, and are relatively modest, suggesting that most people were able to answer the questions

[8] These differences between self assessment and actual heath status probably reflect cultural differences. It is generally less acceptable among Italians, for example, to 'boast' about being in good health.

meaningfully in the survey, in spite of the possible cognitive difficulties typically associated with small mortality risks.[9]

Table 3. Percent of the sample who have various problems with risk comprehension. Based on complete samples.

	UK	Italy	France
A. Wrong answer in the probability quiz	15.33	11.64	22.74
B. Confirms wrong answer in the probability quiz	0.91	2.74	4.01
C. Probability choice question:			
-- prefers person with higher risk	14.29	11.99	10.37
-- indifferent	6.97	10.96	22.41
D. Confirms wrong answer in the probability choice question	1.52	3.08	1.34
A and **C** (FLAG1=1)	2.45	3.77	2.01

IV. Responses to the Payment Questions and WTP Figures

In Figure 1, we show the percentage of 'yes' responses to the initial payment questions for the 5 in 1000 risk reduction. Economic theory suggests that the percentage of 'yes' responses should decline with the bid amount, and indeed this is borne out in the data.

To obtain WTP figures for the 5 in 1000 risk reduction, we combine the responses to the initial and follow-up payment questions to form intervals around the respondent's (unobserved) WTP amount. For example, if a respondent is willing to pay the initial bid of, say, €100, and declines to pay the follow-up amount of €225, it is assumed that his WTP falls between €100 and €225.

[9] See Desaigues et al. (2003) for a discussion of the cognitive difficulties in the French study. In focus groups conducted in Italy in 2003 using a similar questionnaire, we found that most of the people who failed the probability quiz had simply misread the question. These persons immediately corrected their answer without being prompted to do so. Having failed the probability quiz on the first attempt, and having corrected their answers, they then read more carefully the probability choice question. We believe that this is the reason why failures on the first attempt in both the probability quiz and probability choice question were infrequent.

We further assume that WTP follows the Weibull distribution with scale parameter σ and shape θ, which we estimate using the method of maximum likelihood after pooling the data from the three countries.[10, 11] The pooled sample excludes individuals who failed the probability quiz and choice question ([FLAG1=1]). Since the cdf of a Weibull variate is $F(y) = 1 - \exp\{-(y/\sigma)^{\theta}\}$, the log likelihood function is:

$$\text{(1)} \qquad \log L = \sum_{i=1}^{n} \log\left[\exp\left(-\left(\frac{WTP_i^L}{\sigma}\right)^{\theta}\right) - \exp\left(-\left(\frac{WTP_i^U}{\sigma}\right)^{\theta}\right)\right],$$

where WTP^L and WTP^U are the lower and upper bound of the interval around the respondent's WTP amount. Equation (1) describes an interval-data model.[12] Mean WTP is equal to $\sigma \cdot \Gamma\left(\frac{1}{\theta} + 1\right)$, where $\Gamma(\bullet)$ is the gamma function, and median WTP is equal to $\sigma \cdot [-\ln(0.5)]^{1/\theta}$.

The maximum likelihood routine estimates σ to be 6.7904 (standard error 0.079) and θ to be 0.6979 (s.e. 0.041). Mean WTP from the pooled sample is €1129 per year (s.e. €132.5), while median WTP per year is pegged at €526 (s.e. €39.5). The implied VSLs are €2.258 million and €1.052, respectively. These figures are well within the range of values recommended by DG Environment (€1.0-€2.5 million), and the VLSs from individual studies used by the US EPA in its guidelines (2000).

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[10] Pooling the data is the appropriate way to conduct a meta-analysis to assess the effect of an experimental treatment when the experiment are conduced on different groups of subjects using the same instrument and sampling plan, and observing the same outcome variable (Hedges and Olkin, 1985). In this case, one would want to test whether the effect of the experimental treatment is significant, and whether interactions between group dummies and the experimental treatment variable are jointly significant. Our focus in this paper is on regression analyses, rather than on the response to an experimental treatment, which implies that we wish to check whether country dummies are significantly associated with WTP, and whether interactions between certain regressors of interest and the country dummies are significant.

[11] We only use the data from wave 1 for the French study.

[12] We also fit likelihood functiond based on lognormal, normal and exponential distributions, finding that they were all outperformed by the Weibull model.

V. The Effect of Income

To check internal validity, we fit an accelerated life Weibull model that relates WTP to covariates. Specifically, we allow the scale parameter to vary across individuals:

(2) $$\sigma_i = \exp(\mathbf{x}_i\boldsymbol{\beta}),$$

where $\mathbf{x}_i$ is a 1×p vector of regressors, and β is a p×1 vectors of coefficients. (In other words, $\log WTP = \mathbf{x}_i\boldsymbol{\beta} + \varepsilon_i$, where ε follows the type I extreme value distribution with scale θ.)

We report the estimation results for the accelerated-life Weibull model in table 4. Column (A) reports a specification where the only covariate is household income. Income is positively and significantly associated with WTP, a result that is consistent with expectations.

The results from this specification can be used to answer the policy question as to whether the VSL depends on a country's income. Our model implies that median WTP for a country with income equal to €Y thousand is equal to $\exp(6.4648 + 0.0089 \cdot Y) \times [-\ln(0.5)]^{1.42}$. For a country with annual household income of €20,000, median WTP is €456 per year. This implies a VSL of €912,000. If household income is €15,000, median WTP is €435, for a VSL of €870,000, and if household income is €27,000, median WTP is €484 per year, implying a VSL of €968,900. At €39,000 annual income (the average household income in the UK), median WTP is €538, and VSL is €1.078. At this level of income, the income elasticity of WTP is roughly 0.46, whereas at the lowest level of income considered in these calculations, €15,000, the income elasticity is 0.22.[13] Figure 3 shows the VSL-income relationship, with expected values in the Czech Republic, France, Germany without the Eastern States and the UK.

In column (B) of Table 4, we include country dummy variables to account for the different sampling frames at the different locales where the survey was administered. Holding household income the same, the French and the Italian respondents hold WTP values that are greater than their UK counterparts. In this specification, the coefficient of income is larger in magnitude than, but is within 10% of, its counterpart in specification (A).

VI. The Effects of Age and Health

The specification of column (C) of table 4 includes age dummies, gender, education, and measures of the health status of the respondent. This specification allows us to see whether the VSL should be adjusted for the beneficiary's age and health status in environmental policy applications.

It should be noted that the sign of the coefficient on age and health status variables is not known *a priori* (Alberini et al., 2004). To illustrate why theory does not offer unambiguous predictions about the relationship between age and WTP, consider a life-cycle model of lifetime consumption, where the individual maximizes lifetime expected utility by his or her choice of consumption C_t:

(3) $$V_j = \sum_{t=0}^{T} U(C_{j+t}) q_{jt} (1+\delta)^{j-t},$$

[13] We also estimated a model that replaces household income with log household income, implying a constant income elasticity of WTP. The latter is pegged at 0.36 if income is the only covariate, and at 0.43 if country dummies are included in the right-hand side of the model.

where U( ) represents the utility function, q_{jt} is the probability of surviving age t, conditional on being alive at age j, and δ is the intertemporal rate of preference. The budget constraint can be expressed in various ways, depending on the assumption one wishes to make about borrowing and lending opportunities for the individual.

It can be shown that the VSL, which is defined as the rate at which the individual trade offs income for the risk of dying at the end of the current period, is equal to:

(4) $$VSL_j = \frac{1}{1-D_j}\sum_{t=0}^{T} q_{jt}(1+\delta)^{j-t}\frac{U(C_t)}{U'(C_t)},$$

where D_j is the probability of dying at age j. Willingness to pay for a small risk change, dD_j, is thus $VSL_j dD_j$.

Equation (4) suggests that one should expect WTP to increase with baseline risk, D_j, which is increasing in age. It is not clear, however, if and how the term $U(C_t)/U'(C_t)$ depends on age, so the next effect on VSL is ambiguous.[14] Similar considerations hold for health status.

The sign of education is also not known *a priori*. One might expect respondents with higher educational attainment to be able to process the risk information better, but in earlier research that utilized the same survey instrument Krupnick et al. (2002) and Alberini et al. (2004) found that more highly educated respondents actually reported *lower* WTP amounts.[15]

Column (C) shows that none of the coefficients of the age dummies is significant at the conventional levels. WTP, however, appears to be lower for the oldest respondents

[14] Working with the isoelastic utility function, $U(C)=C^{\beta}$, and $\beta=0.2$, Shepherd and Zeckhauser (1982) obtain an inverted-U shaped relationship between WTP and age. Jones-Lee et al. (1976), Johannesson et al. (1997), and Persson et al. (2001) empirically a find quadratic relationship between age and WTP.

in the sample (the 70-year-olds and older), whose WTP amounts are approximately 20% lower than those of younger respondents. As mentioned, however, this effect is not statistically significant at the conventional levels. The results are thus similar to those of the earlier Canada and US studies (Krupnick et al., 2002; Alberini et al., 2004).

We use three variables to capture the possible effects of health status on WTP. The first is a dummy taking on a value of one if the respondent suffers from any chronic cardiovascular or respiratory illnesses (CHRONIC). The second is a dummy for whether the respondent has been hospitalized or has gone to emergency room in the last 5 years for a heart or lung problem (ER_HOSPITAL). Finally, we create a dummy to indicate whether the respondent has or has had cancer.

As shown in table 4, column (C), the fact that a respondent has a chronic heart or lung condition does not influence WTP *per se*. However, those persons who have been hospitalized for cardiovascular or respiratory illnesses over the last 5 years have WTP amounts that are, all else the same, roughly twice as large as those of all others.

Finally, caution is necessary in interpreting the coefficient on the cancer dummy. The estimated coefficient is 0.44, which would imply that WTP is 55% greater among persons who have had (or have) cancer. This provides support for the DG Environment adjustment for cancer-related deaths, which is of approximately the same order. However, the coefficient on the cancer dummy is not significant at the conventional levels. We believe that this is due to the small fraction of respondents (about 6 percent) who report having (or having had cancer). We conclude that future research that wishes

[15] One possible explanation for this finding is that more highly educated individuals believed that they would be capable of obtaining risk reductions through behaviors and actions other than the hypothetical product described in the survey.

to investigate the so-called cancer premium should consider oversampling among persons with cancer (or who have had cancer).

Finally, males have slightly lower WTP amounts, as so do people with higher levels of education, but these effects are not significant at the conventional levels.

In column (D), the regression is re-run with country dummies included among the covariates. The coefficient on the dummies for Italy and France are strongly significant and positive, indicating higher values of WTP in this countries. Most of the other coefficients, however, including the coefficient on household income, remain virtually unchanged. The fact that both the country dummies *and* income are significant suggests that in making full adjustments for WTP we have to take account of both these factors, and that a simple adjustment based on income alone may not be adequate.

Table 4. Pooled data interval-data regressions for WTP. 5 in 1000 risk reduction.[a] Standard errors in parentheses.

	(A)	(B)	(C)	(D)
Intercept	6.4648** (0.126)	6.0057** (0.148)	6.7208** (0.342)	5.8024** (0.386)
Household income (thou. Euro)	0.0089** (0.0029)	0.0097** (0.0029)	0.0098** (0.0031)	0.0098** (0.0031)
Age 50-59 (dummy)			-0.0702 (0.196)	0.0245 (0.190)
Age 60-69 (dummy)			0.0391 (0.207)	0.2056 (0.204)
Age 70 or older (dummy)			-0.2144 (0.263)	-0.0748 (0.256)
Male (dummy)			-0.1831 (0.147)	-0.1842 (0.142)
Education			-0.0217 (0.023)	0.0072 (0.024)
Chronic respiratory or cardiovascular illness (dummy)			0.0409 (0.157)	0.076 (0.152)
ER or emergency room visit (dummy)			0.7445** (0.292)	0.5944* (0.282)
Has or had had cancer (dummy)			0.4399 (0.326)	0.4397 (0.315)
France dummy		0.8405** (0.205)		0.8636** (0.214)
Italy dummy		0.6556** (0.160)		0.6705** (0.162)
Shape parameter (θ)	0.7014 (0.042)	0.7276 (0.043)		0.7400 (0.044)

[a] Only wave 1 is used for the data from the French study. Respondents with FLAG=1 excluded.
* = significant at the 5% level; ** = significant at the 1% level.

VI. Valuing Extensions in Life Expectancy

In our mortality risk survey, we ask respondents to value a reduction in their risk of dying over the next 10 years. This allows us to compute the VSL, as we have done in Section IV. However, certain policy applications, such as those associated with the ExternE project and the Clean Air For Europe initiative, have couched the mortality effects of pollution in terms of changes in remaining life expectancy (or loss/gain of days/months of life spread over the population) to be consistent with the findings from the epidemiological models.

Rabl (2001) derives the changes in remaining life expectancy associated with the 5 in 1000 risk change over the next 10 years valued in this study, based on empirical life-tables. According to Rabl's calculations, the extension in life expectancy ranges from 0.64 to 2.02 months, depending on the person's age and gender, and averages 1.23 months (37 days) for our sample.[16]

To find out the value of a life-expectancy extension of a month, we divide a respondent's WTP by that respondent's life expectancy extension. A Weibull double-bounded model pegs mean WTP at €1052 (s.e. 128.4) per year for each month of additional life expectancy. Median WTP is €465 (s.e. 33.3) for a month of life expectancy gains. Because in our survey the payments would be made every year for ten years, the total WTP figures for a life expectancy gain of one month are €10,520 and €4650 respectively. The implied values of a statistical life-year (VSLY) are €125,250 and €55,800, respectively.

We also regress WTP per month of life expectancy gain on individual characteristics. Results are reported in table 5, Column (A). All else the same, the French respondents hold the highest WTP amounts, followed by the Italians. The coefficient on income is positive and significant, whereas education and gender have no explanatory power.

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[16] A change in the probability of surviving the next 10 years changes the probabilities of surviving all future periods, conditional on being alive today. The sum of these future probabilities of surviving is a person's remaining lifetime. Rabl's calculations are based on an exponential hazard function, $h(t)=\alpha*\exp(\beta t)$, where t is current age, and α and β are equal to 5.09*E-5 and 0.093 for European Union males, respectively, and 1.72E-5 and 0.101, respectively, for European Union females.

We are particularly interested in seeing if the WTP of persons with a compromised health status is systematically different. Column (A) shows that these persons are willing to pay about 10% more than respondents without a chronic illness, but this effect is not statistically significant at the conventional levels. Having been to the hospital or emergency room for a cardiovascular or respiratory illness, however, raises WTP by 89%. Persons with cancer do have a higher WTP, but, once again, this effect is not statistically significant.

Regarding the effect of age, we find that WTP per month of life expectancy gain is higher among older persons, which suggest that the marginal utility of life expectancy extensions increases with age. The coefficients on the age group dummies imply that persons of ages 60 and older are willing to pay, all else the same, 1.27 times the amount of the youngest age group (the 40-49 years olds), while the WTP of persons of ages 50-59 is about 37% that of the youngest respondents.

These results are based on the life expectancy gains predicted on the basis of population life tables, but it may be the case that our individuals translate the risk reduction into life expectancy gains based on their own estimate of their remaining life years. If that is the case, we should compute the life expectancy extensions over the respondent's subjective remaining life years using Rabl's approach,[17] divide WTP by the gain in life expectancy for the respondent, and fit a Weibull model to this new WTP.

We estimate mean WTP for a month of subjective life expectancy gain to be €1183 per year (s.e. 152.4), and median WTP to be €485 per year (s.e. 39.1). These

[17] These calculations result in an average subjective life expectancy gain of 1.2 months, which is very similar to the average objective life expectancy gain.

figures are in line with those from the "objective" approach, and result in VSLYs of €142,000 and €58,200, respectively.

In column (B) of table 5 we report the results of a regression relating WTP per month of subjective life expectancy gain on individual characteristics. WTP per month is positively and significantly related to income, is slightly lower for males, and higher for persons with previous admissions to the hospital or emergency room for cardiovascular problems. As with WTP per month of objective life expectancy, we find that WTP is higher among the elderly persons in our sample. Indeed, comparison of columns (A) and (D) shows that most coefficients are similar across the two regressions. We attribute this result to the fact that individuals reported subjective expected lifetimes that are very close to population averages (see Figure 2).

There is, of course, another way of examining the relationship between WTP and the "subjective" gain in life expectancy. This is to simply regress WTP on the subjective gain in life expectancy, or a transformation of it. We follow this approach in table 6, where we work with the logarithmic transformation of subjective life expectancy gain. The first column presents a relatively simple specification, which shows that WTP increases significantly with subjective life expectancy gains, and that this increase is not strictly proportional to such gains. (The coefficient of log subjective gain is less than 1.)

Table 5. Double-bounded Weibull models based on WTP for the 5 in 1000 risk reduction. Pooled data.[a] Standard errors in parentheses.

	A Dep. Var.: WTP per month of life expectancy extension, based on population life table (N=713)	**B** Dep. Var.: WTP per month of life expectancy extension, based on subjective remaining life years (N=710)
Intercept	5.1539** (0.388)	5.2527* (0.414)
France dummy	0.8658** (0.216)	0.9451** (0.226)
Italy dummy	0.6500** (0.162)	0.7585** (0.171)
Household Income (thou. Euro)	0.0093** (0.0032)	0.0079* (0.0034)
Male (dummy)	-0.0632 (0.143)	-0.2515^ (0.150)
Education (years of schooling)	0.0121 (0.024)	0.0136 (0.026)
Chronic (dummy)	0.1005 (0.153)	0.2038 (0.159)
ER or hospital visit (dummy)	0.6492* (0.286)	0.7248* (0.300)
Cancer (dummy)	0.4421 0.313	0.5434^ (0.328)
Age 50 to 59 (dummy)	0.3172^ (0.193)	0.3165^ (0.201)
Age 60 to 69 (dummy)	0.8530** (0.206)	0.7935** (0.215)
Age 70+ (dummy)	0.7950** (0.261)	0.7213** (0.279)
Shape parameter (θ)	1.3398 (0.044)	0.7213 (0.041)

[a] Only wave 1 is used for the data from the French study. Respondents with FLAG=1 excluded.
** significant at the 1% level. * = significant at the 5% level. ^ = significant at the 10% level.

In the regression of column (B) we include individual characteristics of the respondent, finding that WTP increases with income. Regarding the possible effect of age, there is now little evidence that WTP varies with age, but the regression results hint at a possible inverted-U shaped-relationship. As before, while the presence of chronic illnesses *per se* does not affect WTP, having been to the hospital for cardiovascular or respiratory illnesses in the last 5 years raises significantly WTP. The coefficient on the cancer dummy is about 0.46, but once again we do not find this estimated coefficient to be statistically significant.

Table 6. Double-bounded Weibull models based on WTP for the 5 in 1000 risk reduction. Pooled data.[a] Standard errors in parentheses.

	A (N=733)	**B** (N=710)
Intercept	6.3135** (0.101)	5.5264** (0.395)
France dummy	0.8225** (0.204)	0.9025** (0.214)
Italy dummy	0.6922** (0.157)	0.7043** (0.162)
Log(subjective life expectancy gain, in yrs)	0.3059* (0.147)	0.3752* (0.188)
Household Income (thou. Euro)		0.0085** (0.0032)
Male dummy		-0.2086 (0.142)
Education (years of schooling)		0.0157 (0.024)
Chronic dummy		0.122 (0.154)
Er_hospital dummy		0.6576* (0.283)
Cancer		0.4613 (0.309)
Age 50 to 59 (dummy)		0.1239 (0.198)
Age 60 to 69 (dummy)		0.3942^ (0.233)
Age 70+ (dummy)		0.260 (0.295)
Scale parameter (θ)	0.7394 (0.047)	0.7566 (0.046)

[a] Only wave 1 is used for the data from the French study. Respondents with FLAG=1 excluded.

** significant at the 1% level. * = significant at the 5% level. ^ = significant at the 10% level.

VI. Discussion and Conclusions

Using the responses to our contingent valuation survey questions, we estimate the VSL to be €1.052 to €2.258 million. Our study provides only weak evidence of a relationship between age and the VSL. Willingness to pay for a reduction in the risk of dying is roughly 20% lower among our oldest respondents, but this effect is not statistically significant. We also find that people are willing to pay more for the risk reduction if they have experienced cardiovascular or respiratory problems serious enough to require hospitalization or a visit to the emergency room in the last five years.

Due to the small fraction of persons who now have or previously have had cancer, the evidence of a relationship between this ailment and the VSL is statistically weak. The magnitude of this effect, however, is consistent with figures recently recommended for use by the European policymakers in their recent policy analyses. Finally, VSL does depend on income.

We convert the risk reductions posited to the respondent in the survey into life expectancy extensions, under the assumption that the risk reduction would not be permanent, and that after 10 years the respondent would be facing again his original survival probabilities. This results in an average extension of 1.2 month in the respondent's expected remaining lifetime, and in a Value of a Statistical Life Year of €52,000-142,000.

We are aware of only two other studies that have employed stated preference techniques for placing a value on life expectancy gains, Johannesson and Johansson (1996) and Morris and Hammitt (2000). Both of these studies value an extension to expected remaining lifetime that would be experienced at a future age (60, 70 or 75 years) and be paid for only once (this year), and examine risk reductions or remaining lifetime extensions that are four to ten times larger than those of our study.[18]

These studies are not directly comparable to ours, but, even accounting for the futurity of the risk reduction or life expectancy extension, they seem to imply much lower WTP figures than those produced by our study. For example, Johannesson and Johansson report that the mean WTP for a one-year increase in remaining lifetime at age 75 is between $400 and $1500, depending on the statistical modeling of the responses, and that the corresponding VSL is in the range of $30,000 to $110,000. Morris and Hammitt's estimates of median WTP imply that an extension of one year in remaining lifetime is worth between $698 and $492, and that VSL is $140,000-148,000.

The Morris and Hammitt study provides mixed evidence about the effect on WTP of framing the valuation exercise in terms of risk reduction or and life expectancy gains, which we interpret to imply that more research is needed before any recommendation can be made about asking people to value the former or latter.

Our results give some new answers to the research questions we have posed. Future research will need to confirm these findings before our conclusions can become established in policy appraisal. Future research should also broaden its coverage to other EU countries as well as forging greater consistency with QALY measures that evaluate life expectancy change in health policy resource allocation.

References

[18] For example, the respondents in the Morris and Hammitt study were asked to consider a vaccine against pneumonia that would be administered to the respondent and paid for only once (this year), and would result in an extension in remaining lifetime of 11 (at age 60) or 5 months (at age 70). The corresponding risk reductions would be 0.2%--or 2 in 1000—per year. By contrast, in our survey the risk reductions are of the order of 5 (or 1) in 1000 over 10 years, or 5 (1) in 10,000 per year.

Alberini, Anna (2003), "Willingness to Pay for Mortality Risk Reductions: Preliminary Results from Europe," Preliminary Report Submitted to DIEM, University of Maryland, College Park, July.

Alberini, Anna, Maureen L. Cropper, Alan Krupnick, and Nathalie Simon (2004), "Does the Value of a Statistical Life Vary with Age and Health Status? Evidence from the U.S. and Canada," *Journal of Environmental Economics and Management*, 48(1), 769-792.

Bateman, I. et al. (2003), *Economic Valuation with Stated Preference Techniques. A Manual*, Cheltenham, UK: Edward Elgar.

Desaigues, Brigitte et al. (2003), "Monetary Valuation of Air Pollution Mortality: Current Practice, Research Needs, and Lessons from a Contingent Valuation Survey," unpublished paper, Universite' de Paris, Paris, France, December.

Friedrich, R. and Bickel, P. (eds.) (2001), *Environmental Costs of Transport*, Berlin: Springer-Verlag.

Hedges, Larry V. and Ingram Olkin (1985), *Statistical Methods for Meta-Analysis*, San Diego: Academic Press.

Johannesson, Magnus, and Per-Olov Johannsson (1996), "To Be or Not to Be, That is the Question: An Empirical Study of the WTP for Increased Life Expectancy at an Advanced Age," *Journal of Risk and Uncertainty*, 13, 164-174.

Jones-Lee M.W., (1976). *The Value of Life: An Economic Analysis*. Martin Robertson, London.

Krupnick, Alan, Anna Alberini, Maureen Cropper, Nathalie Simon, Bernie O'Brien, Ron Goeree, and Martin Heintzelman (2002), "Age, Health, and the Willingness to Pay for Mortality Risk Reductions: A Contingent Valuation Survey of Ontario Residents," *Journal of Risk and Uncertainty*, 24, 161-186.

Markandya, Anil and Ari Rabl (2004), "Valuation of Air Pollution Mortality: How to Achieve Consistency between the Epidemiological Studies and the Monetary Valuation," University of Bath Centre for Public Economics Working Paper No. 07-04.

Persson, Ulf, Anna Norinder, Krister Hjalte and Katarina Gralen (2001), "The Value of a Statistical Life in Transport: Findings from a New Contingent Valuation Study in Sweden," *Journal of Risk and Uncertainty*, 23(2), 121-134.

Rabl, Ari (2001), "Relationship between Life Expectancy and Probability of Dying," unpublished paper, Ecole des Mines, Paris, April.

Shepherd, D.S. and R. J. Zeckhauser (1982), "Life-Cycle Consumption and Willingness to Pay for Increased Survival," in M.W. Jones-Lee et al. (eds.), *The Value of Life and Safety*, Amsterdam, The Netherlands: North-Holland.

U.S. Environmental Protection Agency (2000), Guidelines for Preparing Economic Analyses, EPA 240-R-00-003, Washington, DC, September.

Appendix.

Table A.1. Bid design by country.

	Initial bid	If yes	If no
UK (Pound Sterling)	45	100	20
	100	325	45
	325	475	100
	475	650	325
Italy (Euro)	80	170	35
	170	570	80
	570	830	170
	830	1140	570
France (Francs)	500	200	1000
	1000	500	3500
	3500	1000	5000
	5000	3500	7000

Figure 1.

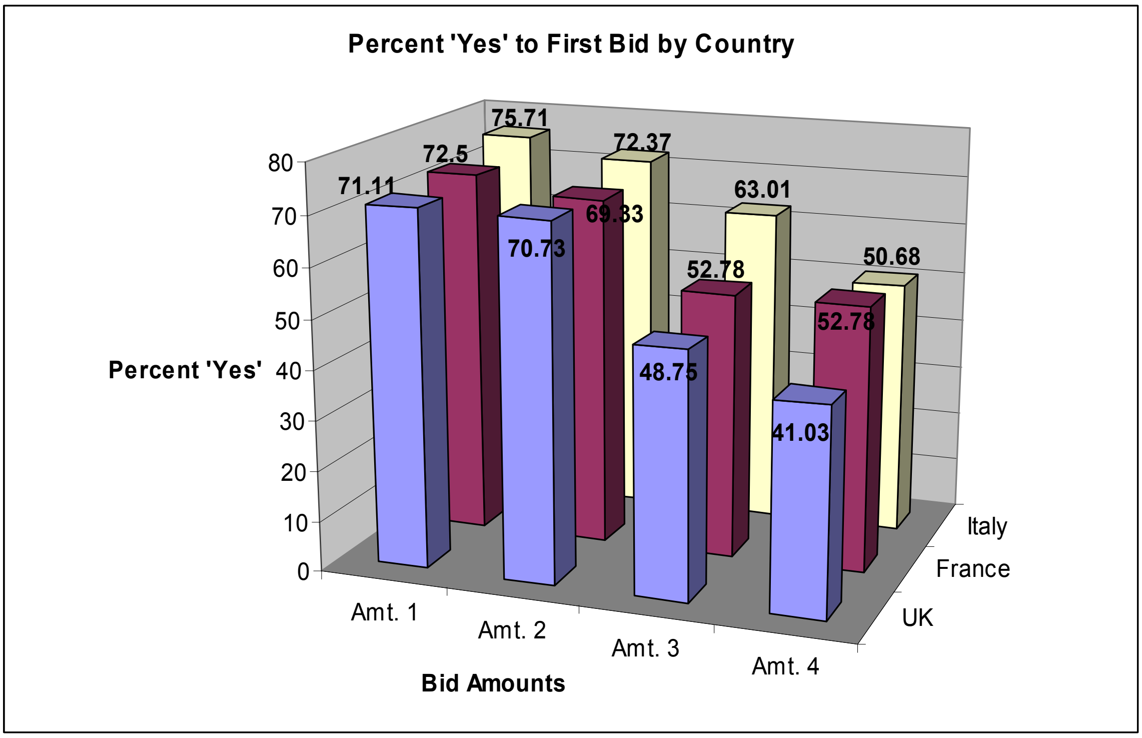


Figure 2.

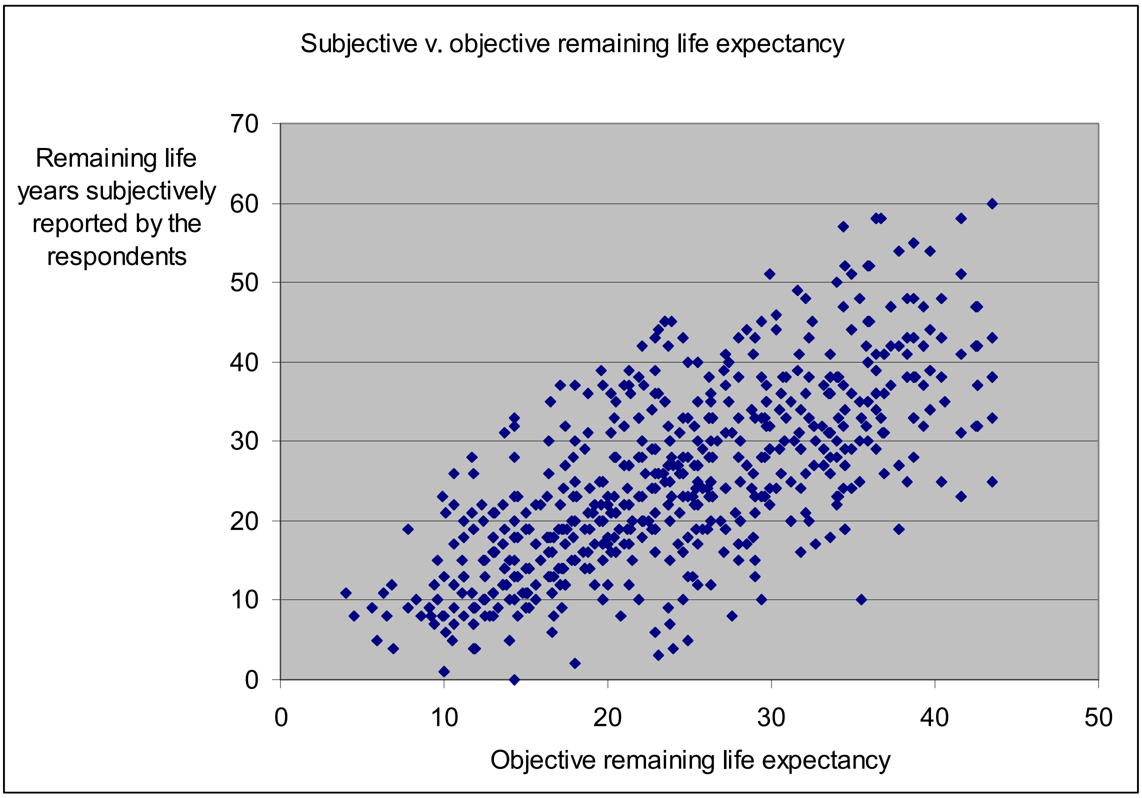
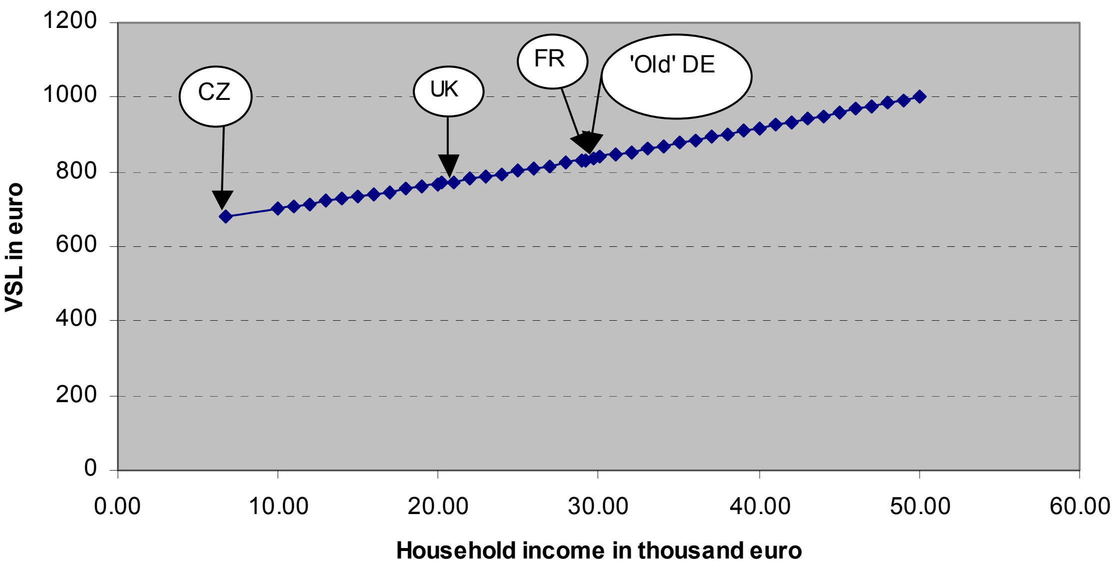


Figure 3: VSL as a function of household income (based on median WTP)



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