From: Maguire, Kelly
To: Armitage, Thomas
Cc: McGartland, Al; Simon, Nathalie; Dockins, Chris; Newbold, Steve
Subject: materials for SAB-EEAC
Date: Monday, June 27, 2016 7:07:29 AM
Attachments:

Hi Tom ,

I am sending this on behalf of Nathalie Simon as a follow up to the SAB-EEAC teleconference. Several members, including Richard Ready, in particular, were interested in the full results from the Viscusi, Huber, and Bell (2014) study on-line Appendix and specifically whether or not the model included a constant.

One of the co-authors, Jason Bell, sent the full results, and we've summarized all of the validity information for this study in the attached.

1. VHB validiy_6.24.16.docx (our summary of the study's validity information, including the full results from the on-line Appendix Jason recently sent)
2. Viscusi Huber Bell 2014.pdf (original study)
3. Viscusi Humber BellOnline Appendix.docx (the on-line appendix referenced in the study)
4. Viscusi Huber Bell CancerRisk Table 2 all variables shown.docx (the full set of results from Table II)

We hope this answers the EEAC's questions. Please let us know if you (or they) need more information.

Thank you,

Kelly

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EPA's summary of the study's validity information (including the full results from the on-line appendix)

Viscusi, Huber, and Bell (2014)
Assessing Whether There is a Cancer Premium for the Value of a Statistical Life
Health Economics 23: 384-396

The following bullet list outlines how validity was described in the Viscusi, Huber, and Bell (VHB) paper, along with supplemental information that can be used to assess validity.

<u>Table II in VHB (p. 392, Interval regressions)</u>

- All three models show a significant and positive coefficient on the "treatment reduces risk to zero" variable, indicating some responsiveness to risk changes.
- The models include two variables to measure self-perceptions about cancer risk (i.e., "considers own cancer risk high" and "consider own cancer risk low").
  - For those who consider their own risk to be high, there is a significant and positive impact on willingness to pay (WTP), representing an increase in VSL of $4.97 million.
  - For those who consider their own risk to be low, there is a significant and negative impact on WTP, representing an $0.864 million decrease in VSL.
  - The authors conclude "This asymmetry *[i.e., a positive impact on VSL for those who consider their cancer risk to be high versus a negative impact on VSL for the low-cancer risk group]* in the effect is consistent with the behavioral hypothesis that upward deviations in beliefs about risk relative to the national norm are much more consequential than deviations where the belief is that one is safer than average." (VHB, p. 392)
- The authors also use the coefficients on demographic variables as "additional validity checks," (p. 392), noting in footnote 12 that "These tests often come under headings such as behavioral scope tests. Passing such tests does not ensure survey validity but is an essential hurdle that a survey must pass to be valid."
  - Results show a significant and positive coefficient on the income variable.[1]
  - Environmentalists are more likely to choose a treatment option (which involves higher cost and lower risk). The authors indicate this result is "consistent with a higher value on environmental quality" (p 393).
  - Other demographic variables are consistent with predicted outcomes.
- Table II also includes variables for region, MSA status, starting cost, risk levels and the top-coded income category.
  - The authors sent the full results (see accompanying file, "VHB_Table II_full results.doc").

[1] The authors report a 0.08 income elasticity. The authors attribute the low elasticity to the "modest expenditures" required for small risk reductions in the survey.

- All three models show a significant and negative coefficient on the "starting risk" variable, indicating respondents are willing to pay *less* for a given risk reduction when starting from a higher baseline risk. (This runs counter to our intuition, which would indicate that if the benefits of risk reductions are concave, then respondents should be willing to pay *more* when baseline risks are higher.)

<u>Appendix Table A3 (attached and available on-line)</u>

- Provides the marginal effects of a Probit regression using just the initial choice.
- Results show a significant and positive effect for risk and a significant and negative effect for cost. Both of these results nominally indicate responsiveness to scope. The authors describe these results in the main text of the paper as follows: "That analysis *[shown in the on-line appendix]* also provides a scope test for valuations, demonstrating that respondents are averse to increases in cost and favor decreases in risk." (VHB, p. 393)
- However, in follow-up correspondence Jason Bell indicated that the constant was suppressed in the Probit model described in the appendix. See below.

Email from Jason Bell:

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The appendix A3 table results are *not* dprobit models, they are probit models with
constant suppressed.  I used a template for this table that was drawn from the paper,
so the note at the bottom is incorrect.  Here are the raw STATA outputs for those
three probits:


. probit canyes canccost cancrisk, noconstant

Iteration 0:   log likelihood = -1678.8025
Iteration 1:   log likelihood = -1587.7743
Iteration 2:   log likelihood = -1587.5109
Iteration 3:   log likelihood = -1587.5109

Probit regression                                      Number of obs   =       2422
                                                       Wald chi2(2)    =     173.90
Log likelihood = -1587.5109                            Prob > chi2     =     0.0000

------------------------------------------------------------------------------
      canyes |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    canccost |  -.0031738   .0002997   -10.59   0.000    -.0037613   -.0025863
    cancrisk |   .2455559   .0187866    13.07   0.000     .2087349    .2823769
------------------------------------------------------------------------------

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.
. probit canyes canccost cancrisk if zeroed==1, noconstant

Iteration 0:   log likelihood = -849.79844
Iteration 1:   log likelihood = -798.39786
Iteration 2:   log likelihood =  -798.2434
Iteration 3:   log likelihood =  -798.2434

Probit regression                                      Number of obs   =       1226
                                                       Wald chi2(2)    =      98.15
Log likelihood =  -798.2434                            Prob > chi2     =     0.0000
```

```
------------------------------------------------------------------------------
      canyes |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    canccost |  -.0025587    .000405    -6.32   0.000    -.0033525    -.001765
    cancrisk |   .2169225   .0233465     9.29   0.000     .1711642    .2626807
------------------------------------------------------------------------------


.
.
.
. probit canyes canccost cancrisk if zeroed==0, noconstant

Iteration 0:   log likelihood = -829.00403
Iteration 1:   log likelihood = -786.82325
Iteration 2:   log likelihood = -786.73721
Iteration 3:   log likelihood = -786.73721

Probit regression                                 Number of obs   =       1196
                                                  Wald chi2(2)    =      81.20
Log likelihood = -786.73721                       Prob > chi2     =     0.0000

------------------------------------------------------------------------------
      canyes |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    canccost |  -.0039343   .0004659    -8.44   0.000    -.0048475   -.0030211
    cancrisk |   .2895125    .032315     8.96   0.000     .2261762    .3528488
------------------------------------------------------------------------------
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Attachment 2.

Viscusi, W. K., J. Huber, and J. Bell. 2014. Assessing whether there is a cancer premium for the value of a statistical life. *Health Economics*. 23:384-396.

Attachment 3.

On-line appendix to the following article:

Viscusi W.K., J. Huber, and J. Bell. 2014. Assessing whether there is a cancer premium for the value of a statistical life. *Health Economics* 23:384-396.

This on-line appendix is available at: http://onlinelibrary.wiley.com/doi/10.1002/hec.2919/suppinfo

See file titled: hec_2919_sm_Online_Appendix.docx.

Attachment 4.

Table 2
Interval Regressions of Bladder Cancer Valuations per 100,000 Risk[a]

Variable	One Question	Two Questions	Three Questions
Treatment Reduces Risk to Zero	5.4781***	8.2381***	11.4071***
	(0.5498)	(2.3876)	(3.6314)
Considers Own Cancer Risk High	2.9033**	26.9694***	49.7291***
	(1.2586)	(5.3859)	(8.1401)
Considers Own Cancer Risk Low	-2.3978***	-6.5971***	-8.6398**
	(0.5470)	(2.3821)	(3.6220)
Income / $10,000	0.2126***	0.8903***	1.0592**
	(0.0736)	(0.3192)	(0.4852)
Years of Education	-0.0777	-0.3885	-0.1388
	(0.1114)	(0.4873)	(0.7405)
Age	0.0659***	0.3466***	0.4738***
	(0.0169)	(0.0738)	(0.1122)
Considers Self Environmentalist	2.8369***	14.3618***	22.0332***
	(0.5496)	(2.3851)	(3.6175)
Female	2.1947***	8.7676***	10.5826***
	(0.5254)	(2.2901)	(3.4836)
Race: Black	2.8877***	18.0715***	30.2396***
	(0.8845)	(3.8512)	(5.8811)
Ethnicity: Hispanic	1.1726	11.5530***	22.5658***
	(0.8709)	(3.8456)	(5.8488)
Well User	1.1254	4.2628	0.9955
	(0.7045)	(3.0830)	(4.6972)
Intercept	57.1681***	56.4555***	53.0056***
	(2.1778)	(9.4466)	(14.3798)
Region: Northeast	2.1089***	9.1031**	13.0578**
	(0.8169)	(3.5495)	(5.3938)
Region: South	-0.2662	2.7886	4.0241
	(0.6917)	(3.0318)	(4.6071)
Region: West	0.8948	3.5831	2.5160
	(0.7776)	(3.4081)	(5.1955)
MSA status	-0.6344	-5.4115*	-9.0343*
	(0.7464)	(3.2734)	(4.9886)
Starting Cost	0.3619***	0.2737***	0.2928***
	(0.0036)	(0.0155)	(0.0233)
Starting Risk	-21.0845***	-21.1769***	-22.9941***
	(0.3318)	(1.4448)	(2.1964)
Top Income Category	-1.0909	-2.6340	-0.9109
	(1.8608)	(8.0025)	(12.1287)

[a] Notes: N = 3,430 for all regressions. Regressions also included variables for region, metropolitan statistical area status, starting cost and risk levels, and the top-coded income category of income $175,000 or above at time of survey. Significance levels: *0.10, **0.05, and ***0.01. Cost and income levels are adjusted to 2011 dollars.