#### Imperfect Information in Health Care Markets Exercise Session 3 - Insurance Demand

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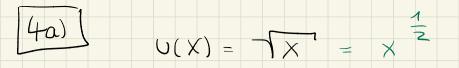
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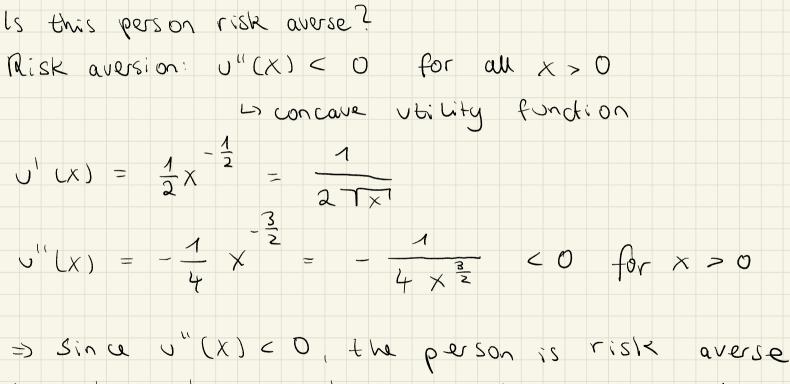
### Questions?

In all exercises, let the person be an expected utility maximizer, i.e. the person's choices satisfy the assumptions of the von Neumann-Morgenstern expected utility theorem.

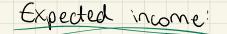
Consider a person with utility of income  $u(x) = \sqrt{x}$ . Is this person risk averse? For the following lotteries, compute the expected income, the certainty equivalent, and the risk premium.

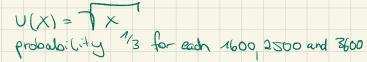
- a) Probability 1/3 for each 1600, 2500, and 3600 Euros.
- b) Income is uniformly distributed between 1600 and 2500 Euros.





We have shown risk aversion by concavity of the stility function.

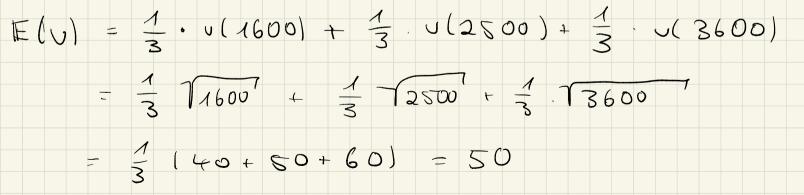




 $E(X) = \frac{1}{3} \cdot 1600 + \frac{1}{3} \cdot 2500 + \frac{1}{3} \cdot 3600$ 

≈ 2566,66

Expected Utility:

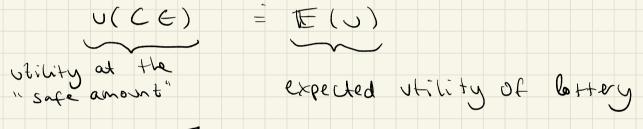


Certainty equivalent (CE):

> measures the safe amount of income that makes

me indifferent to playing the lottery or receiving

the safe amount



 $(=) TCE = 50 1()^2$ 

 $E = CE = 50^2 = 2500$ 

E(x) = 2566,66 > 2500 = CE

Risk premium (RP);

## -> difference between the expected payment from a

lottery and the certainty equivalent of this lottery

RP = E(x) - CE

 $\Rightarrow RR = 2566,66 - 2500 = 66,66 > 0$ 

=> indication that the person is risk-averse

since RP > 0

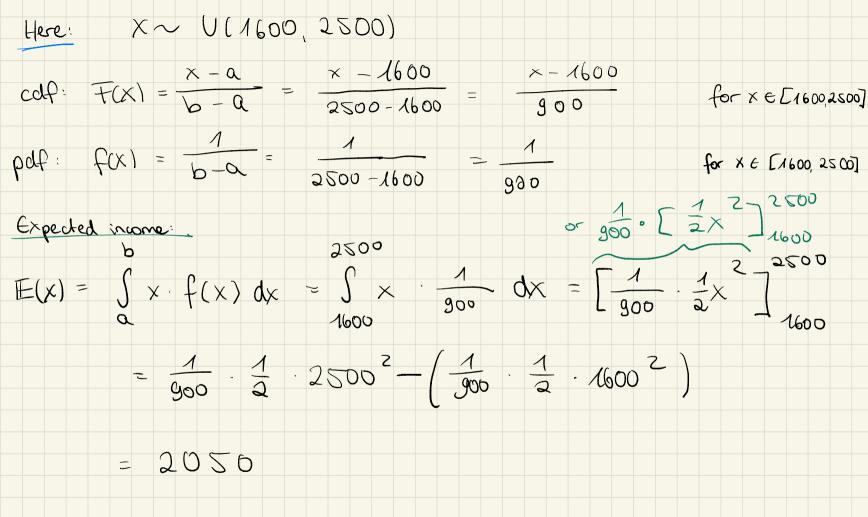


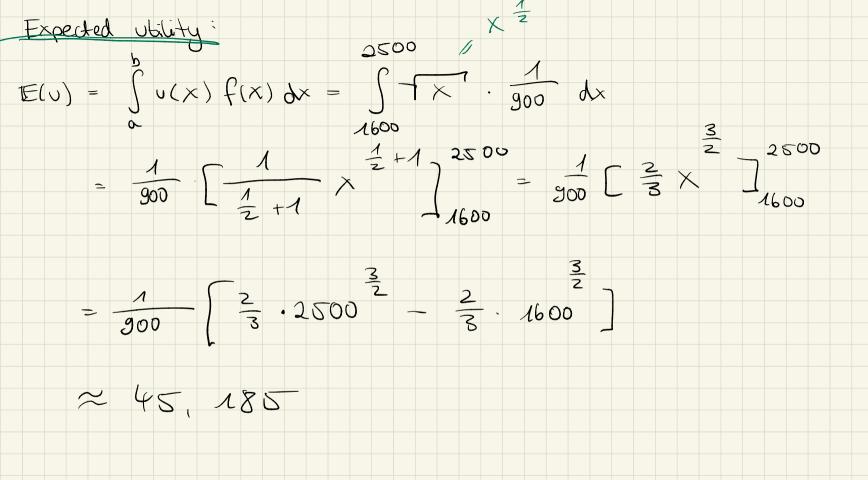
# Income is uniformly distributed between 1600 and 2500 X ~ U(1600, 2500)

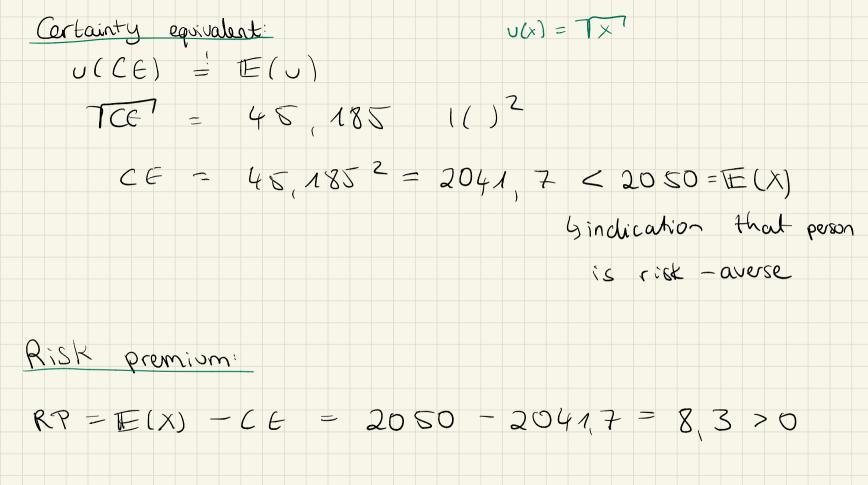
General suform distribution:

 $X \sim U(a,b)$  $cdf: F(x) = \frac{x-a}{b-a}$  for  $x \in [a,b]$ 

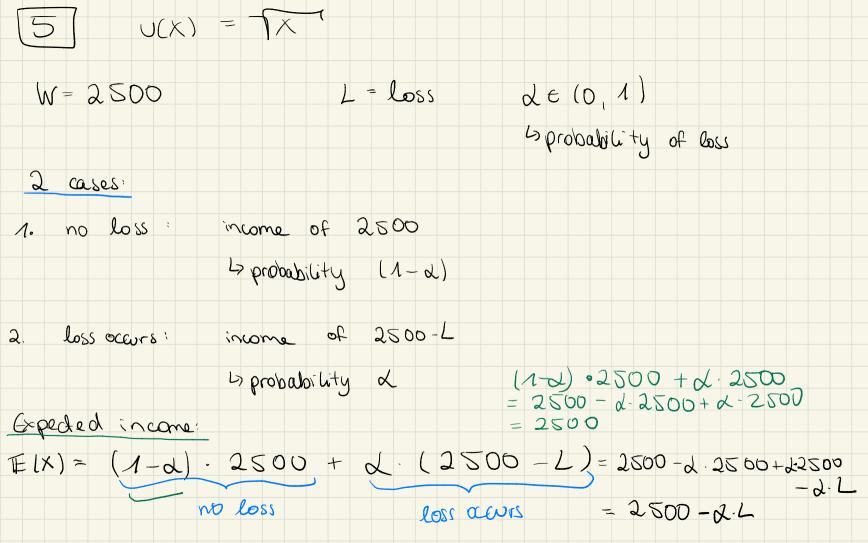
 $pdf: f(x) = \frac{1}{b-a}$  for  $x \in [a,b]$ 







Consider a person with utility of income  $u(x) = \sqrt{x}$ . The person has an income of 2500 Euros but loses *L* Euros with probability  $\alpha$ . Determine the certainty equivalent and the risk premium as a function of  $\alpha$  and *L*. Is the risk premium increasing or decreasing in *L*? Is the risk premium increasing or decreasing in  $\alpha$ ?

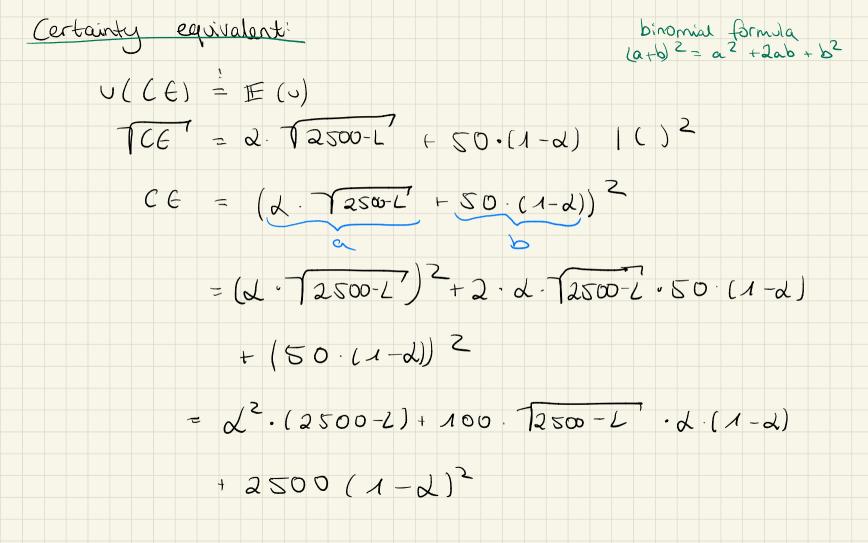


## Expected utility:

# $E(v) = (1 - d) \cdot v(2500) + d \cdot v(2500 - L)$

= (1-d) - 2500 + d. 72500 -L

 $= (1 - 2) \cdot 50 + 2 \cdot 72500 - 2$ 



Risk premium:



RP = 2500 - d.L - 22(2500-L) - 100 - 72500-L - 2(1-2

 $\frac{-2500(1-2)^{2}}{-2500(1-2)^{2}} = -2500(1-22+2^{2})$ = -2500 + 5000 d - 2500 d^{2}

 $RP = -d \cdot L + 5000d - 2d^{2} \cdot 2500 + d^{2} \cdot L - 100 \cdot (1 - d) \cdot d^{2} \cdot 2500 + d^{2} \cdot L - 100 \cdot (1 - d) \cdot d^{2} \cdot 2500 + d^{2} \cdot L - 100 \cdot (1 - d) \cdot d^{2} \cdot d^{2$ 

