

Most people choose A over B, hence:

$$u(1) > 0.10u(5) + 0.89u(1) + 0.01u(0)$$

This can be rewritten using  $u(1) = 0.11u(1) + 0.89u(1)$  as:

$$\begin{aligned} 0.11u(1) + 0.89u(1) &> 0.10u(5) + 0.89u(1) + 0.01u(0) \\ \Rightarrow 0.11u(1) &> 0.10u(5) + 0.01u(0) \end{aligned}$$

Most people choose D over C, hence:

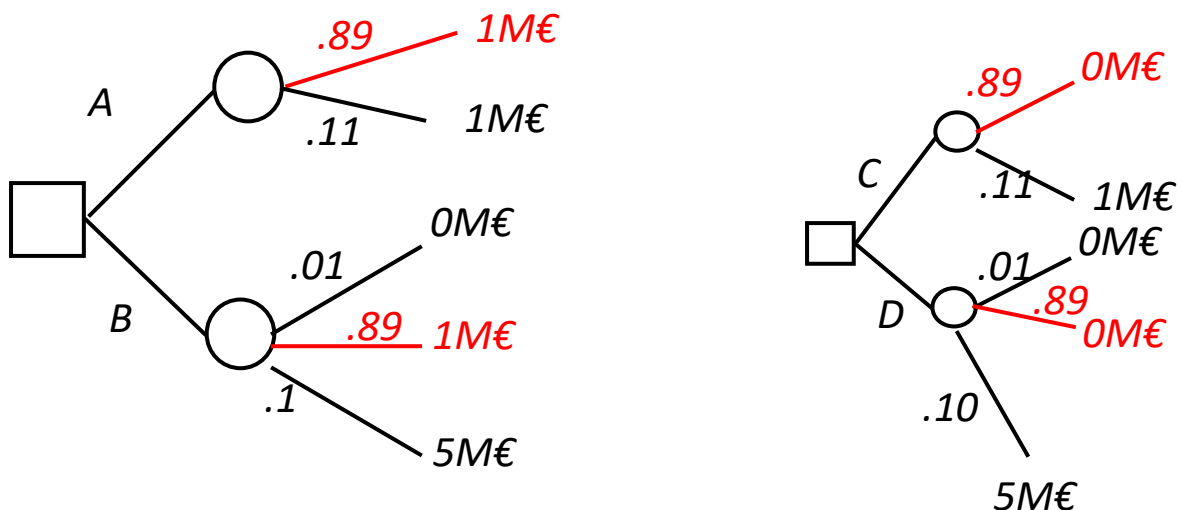
$$0.10u(5) + 0.90u(0) > 0.11u(1) + 0.89u(0)$$

This can be rewritten using  $u(0) = 0.89u(0) + 0.01u(0)$  as:

$$\begin{aligned} 0.10u(5) + 0.89u(0) + 0.01u(0) &> 0.11u(1) + 0.89u(0) \\ \Rightarrow 0.10u(5) + 0.01u(0) &> 0.11u(1) \end{aligned}$$

Note the similarity to the independence axiom, i.e adding lotteries on both sides of the preference equation should not affect preference, but it does!

Pictorially this is also seen if the first gamble is represented as:



Where the 0.89 probability branches can be cancelled out due to the independence axiom. Same goes for the second gamble. After doing this, the top and bottom gambles are equivalent, and it is a paradox that one should choose differently between them.