

## The Allais paradox

You are asked to choose between the following two gambles:

**Gamble A.** A 100 percent chance of receiving 1 million.

**Gamble B.** A 10 percent chance of 5 million, an 89 percent chance of 1 million, and a 1 percent chance of nothing.

Before you read any further pick one of these gambles, and write it down. Now consider the following two gambles.

**Gamble C.** An 11 percent chance of 1 million, and an 89 percent chance of nothing.

**Gamble D.** A 10 percent chance of 5 million, and a 90 percent chance of nothing.

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Again, please pick one of these two gambles as your preferred choice and write it down.

Many people prefer  $A$  to  $B$  and  $D$  to  $C$ . However, these choices violate the expected utility axioms! To see this, simply write the expected utility relationship implied by  $A \succeq B$ :

$$u(1) > .1u(5) + .89u(1) + .01u(0).$$

Rearranging this expression gives

$$.11u(1) > .1u(5) + .01u(0),$$

and adding  $.89u(0)$  to each side yields

$$.11u(1) + .89u(0) > .1u(5) + .90u(0).$$

It follows that gamble  $C$  must be preferred to gamble  $D$  by an expected utility maximizer.