

## Reading Assignment 3: Decisions Under Risk

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**Assigned Reading** Read Chapter 4 in M. Peterson. *An introduction to decision theory*. Cambridge University Press, 2017.

### Technical Requirements

Answer questions two, seven, eight, and nine. Together, your answers should not be longer than a single typed page. Remember to write down the page numbers/ranges that indicate where the concepts necessary for answering the questions are introduced.

1. How do decisions under risk differ from decisions under ignorance? Give an example of each type of decision to illustrate the distinction.
2. Peterson gives three reasons that “the expected monetary value need not correspond to the overall value of a gamble”, and thus, it might be rational to engage in a gamble even if the expected *monetary value* of the gamble is negative. Give your own example to illustrate Peterson’s first reason, and briefly summarize the second reason.
3. According to Peterson, decision theorists agree upon the principle of maximizing expected value?
4. How does Peterson initially define utility, and with what other type of value does he contrast utility?
5. Briefly summarize the first argument decision theorists give for the principle of maximizing expected utility. What does the law of large numbers say and how is it used in this argument?
6. Peterson summarizes at least three distinct criticisms of the use of the law of large numbers in justifying the expected utility principle. The first he attributes to Keynes; the second involves a theorem about gambler’s ruin, and the third concerns the uniqueness of decision problems that we encounter. Pick one of these three criticisms, and summarize it in your own words.
7. Briefly explain the distinction between long-run and “axiomatic” defenses of the expected utility principle. Then summarize the first “indirect” approach to axiomatizing the expected utility principle. As Peterson suggests, the “indirect” approach is the standard, and it is the one we will discuss most in our class. You can skim Peterson’s “direct” approach in the remainder of the section.
8. Copy the decision table from the Allais paradox, and summarize which choices many people make. Then briefly explain why those choices are (generally agreed to be) incompatible with the expected utility principle.
9. Some decision theorists have argued that the choices that many people make in the Allais paradox are compatible with the principle of expected utility. According to those decision theorists, the table of monetary values in the Allais paradox fails to properly “formalize” the decision problem. In your own words, briefly summarize this attempt to defend the expected utility principle, and explain Peterson’s criticism of the argument.
10. Is the Ellsberg paradox an example of a decision under risk? Under ignorance? Explain.
11. Briefly describe the St. Petersburg paradox, and in particular, explain why the decision problem is thought to be an objection the expected utility principle. Peterson describes several responses to the paradox (which all defend the principle of expected utility). Pick your favorite response and summarize it.
12. Briefly summarize the two-envelope paradox and why, again, it is taken to be an objection to the expected utility principle.