**Problem 1:**

An investor has $1,000,000 to invest. All the money must be placed in one of three investments: gold, stocks, or bonds. If $1,000,000 is placed in an investment, the value of the investment one year from now depends on the state of the economy as shown below.

|  |  |  |  |
| --- | --- | --- | --- |
|  | State of Economy | | |
| Investment | Bad | Fair | Good |
| Bonds | $1,140,000 | $1,150,000 | $1,160,000 |
| Stocks | $1,100,000 | $1,160,000 | $1,220,000 |
| Gold | $1,180,000 | $1,140,000 | $1,120,000 |



1. What is the maximax decision?

stocks

1. What is the maximin decision?

bonds

1. What is the equally likely (Laplace) decision?

stocks

1. What is the Hurwicz (criterion of realism) decision with α = 0.8?

stocks

1. Develop a regret table for this decision.



1. What is the minimax regret decision?

bonds

1. What is the Helgason (normal distribution) decision?

HBonds = 1/6\*1140000 + 1/6\*1160000 + 2/3\*1150000 = 1150K

HStocks = 1/6\*1100000 + 1/6\*1220000 + 2/3\*1160000 = 1160K

HGold = 1/6\*1120000 + 1/6\*1180000 + 2/3\*1140000 = 1143K

Favor stocks

**Problem 2:**

The investor in Problem 1 has narrowed her choices to Bonds or Stocks. Furthermore, she believes that the state of the economy will be bad with probability 50% and good with probability 50%.

1. Use the EMV criterion to determine which investment the investor should choose.



Favor stocks

1. What is the expected value of perfect information (EVPI) in this scenario?



EVPI = 1,180,000 - $1,160,000 = $20,000

**Problem 3:**

The investor in Problem 2 can hire a consulting firm to conduct a study of economic indicators to forecast the state of the economy for the next year. The result of the study will be a report that is either *bullish* (suggesting a good economy) or *bearish* (suggesting a bad economy). The firm claims that their experience enables them to use Bayes' theorem to make the following statements of probability:

* The probability of a good economy given a bullish report = 89.5%
* The probability of a bad economy given a bearish report = 85.7%
* The probability of a bullish report = 47.5%
* The probability of a bearish report = 52.5%

1. Develop a new decision tree for the investor to reflect the options now open with the study.

P(GE|Bull) = .895

P(BE|Bull) = .105

P(BE|Bear) = .857

P(GE|Bear) = .143

P(Bull) = .475

P(Bear) = .525

EMV(bonds)=

(.857)(1140000)

+(.143)(1160000)

= $1,142,860

EMV(stocks)=

(.857)(1100000)

+(.143)(1220000)

= $1,117,160

EMV(stocks)=

(.105)(1100000)

+(.895)(1220000)

= $1,207,400

EMV(bonds)=

(.105)(1140000)

+(.895)(1160000)

= $1,157,900

}

}

P=.857

P=.143

P=.895

P=.105

P=.475

P=.525

1. Use the EMV criterion to recommend a strategy.

Recommend investment in stocks given a bull report; investment in bonds given a bear report.

1. What is the expected value of sample information (EVSI) in this scenario?

EVSI = (.475)(1207400)+(.525)(1142860) - 1160000 = $13516.5