

EXAMPLE 3

Monte Carlo Simulation for a Retirement Portfolio with a Proposed Asset Allocation

Malala Ali, a resident of the hypothetical country of Caflandia, has sought the advice of an investment adviser concerning her retirement portfolio. At the end of 2017, she is 65 years old and holds a portfolio valued at CAF\$1 million. Ali would like to withdraw CAF\$40,000 a year to supplement the corporate pension she has begun to receive. Given her health and family history, Ali believes she should plan for a retirement lasting 25 years. She is also concerned about passing along a portion of her portfolio to the families of her three children; she hopes that at least the portfolio's current real value can go to them. Consulting with her adviser, Ali has expressed this desire quantitatively: She wants the median value of her bequest to her children to be no less than her portfolio's current value of CAF\$1 million in real terms. The median is the 50th percentile outcome.

The asset allocation of her retirement portfolio is currently 50/50 Caflandia equities/Caflandia intermediate-term government bonds. Ali and her adviser have decided on the following set of capital market expectations (Exhibit 8):

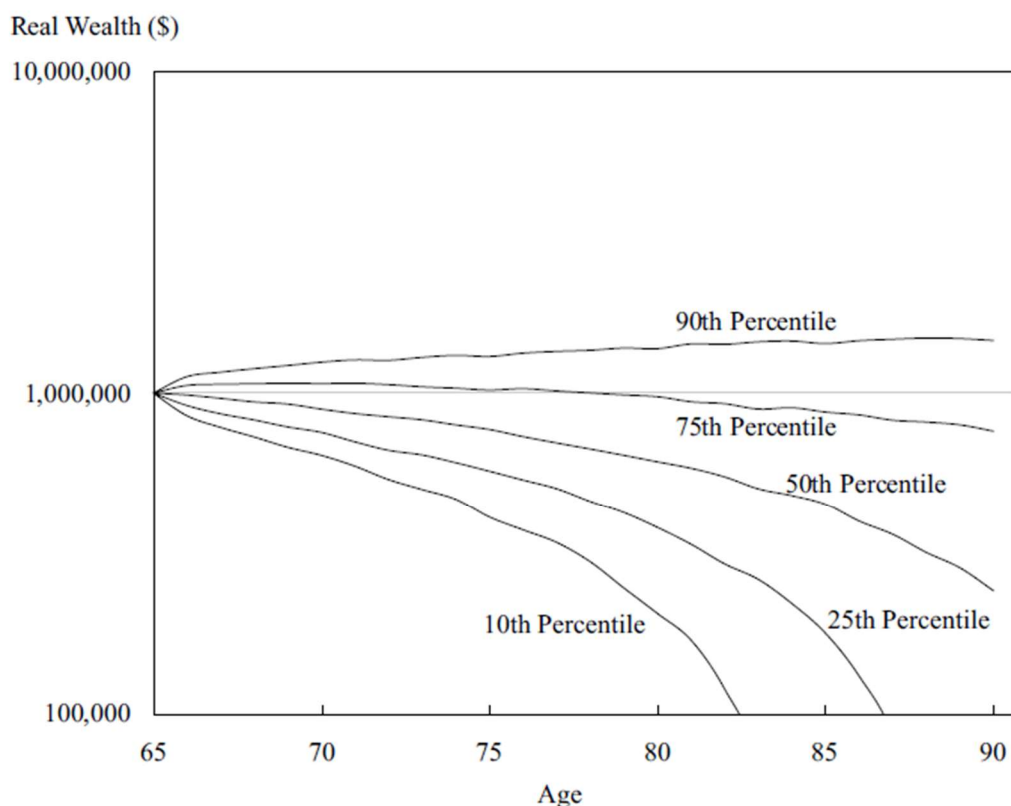
Exhibit 8 Caflandia Capital Market Expectations

Asset Class	Investor's Forecasts	
	Expected Return	Standard Deviation of Return
Caflandia equities	9.4%	20.4%
Caflandia bonds	5.6%	4.1%
Inflation	2.6%	

The predicted correlation between returns of Caflandia equities and Caflandia intermediate-term government bonds is 0.15.

With the current asset allocation, the expected nominal return on Ali's retirement portfolio is 7.5% with a standard deviation of 11%. Exhibit 9 gives the results of the Monte Carlo simulation.¹¹ In Exhibit 9, the lowest curve represents, at various ages, levels of real wealth at or below which the 10% of worst real wealth outcomes lie (i.e., the 10th percentile for real wealth); curves above that represent, respectively, 25th, 50th, 75th, and 90th percentiles for real wealth.

Exhibit 9 Monte Carlo Simulation of Ending Real Wealth with Annual Cash Outflows



Based on the information given, address the following:

- 1 Justify the presentation of ending wealth in terms of real rather than nominal wealth in Exhibit 9.
- 2 Is the current asset allocation expected to satisfy Ali's investment objectives?