Chapter 6

Cost-Benefit Analysis and  
Government Investments

Answers to Text Problems

**1.** The ratio of the price of the highway interchange to the price of the cardiac intensive care unit is 2. The ratio of the marginal products of the two programs and their current output levels is 10/3 = 3.33. Because the ratio of marginal products exceeds that ratio of prices, the current mix of programs is not cost-effective. To improve cost-effectiveness, more highway interchanges should be built and fewer cardiac units should be produced. As this occurs, the marginal product of highway interchanges will fall, while the marginal product of cardiac units will rise. Cost-effectiveness is achieved when the ratio of marginal products is adjusted to equal 2.

**2.** There is a $1 per trip cost savings on the existing 500,000, which provides a benefit of $500,000 per year. The gain in net benefits from the 100,000 new trips is 1/2($1)(100,000) = $50,000 per year. The annual increase in benefits to motorists as a result of the new road will therefore be $550,000.

**3.** The opportunity cost of funds to finance the investments will be 16 percent, which is the equilibrium gross return of airlines required to give a new return of 8 percent, which is the opportunity cost of capital in the economy. Since the project will yield only 12 percent, there will be no increase in net benefits because the opportunity cost of funds exceeds the return on the project.

**4.** The net present value of the project at a 10-percent discount rate is –$1.98 million. The project therefore does not merit approval. Because it has a negative net present value at a 10-percent dis­count rate, it will also have a negative net present value at the higher interest rate of 15 percent.

**5.** At 0 percent, PV = $10,000

At 1 percent, PV = $9,471.30

At 3 percent, PV = $8,530.20

At 5 percent, PV = $7,721,73

At 10 percent, PV = $6,144.57

If the current cost of the project is $8,000, it will have a positive benefit-cost ratio at interest rates of 0 percent, 1 percent, and 3 percent.