CHAPTER 1

THE INVESTMENT SETTING

Answers to Questions

1. When an individual's current money income exceeds his current consumption desires, he saves the excess. Rather than keep these savings in his possession, the individual may consider it worthwhile to forego immediate possession of the money for a larger future amount of consumption. This trade-off of present consumption for a higher level of future consumption is the essence of investment.

   An investment is the current commitment of funds for a period of time in order to derive a future flow of funds that will compensate the investor for the time value of money, the expected rate of inflation over the life of the investment, and provide a premium for the uncertainty associated with this future flow of funds.

2. Students in general tend to be borrowers because they are typically not employed so have no income, but obviously consume and have expenses. The usual intent is to invest the money borrowed in order to increase their future income stream from employment - i.e., students expect to receive a better job and higher income due to their investment in education.

3. In the 20-30 year segment an individual would tend to be a net borrower since he is in a relatively low-income bracket and has several expenditures - automobile, durable goods, etc. In the 30-40 segment again the individual would likely dissave, or borrow, since his expenditures would increase with the advent of family life, and conceivably, the purchase of a house. In the 40-50 segment, the individual would probably be a saver since income would have increased substantially with no increase in expenditures. Between the ages of 50 and 60 the individual would typically be a strong saver since income would continue to increase and by now the couple would be "empty-nesters." After this, depending upon when the individual retires, the individual would probably be a dissaver as income decreases (transition from regular income to income from a pension).

4. The saving-borrowing pattern would vary by profession to the extent that compensation patterns vary by profession. For most white-collar professions (e.g., lawyers) income would tend to increase with age. Thus, lawyers would tend to be borrowers in the early segments (when income is low) and savers later in life. Alternatively, blue-collar professions (e.g., plumbers), where skill is often physical, compensation tends to remain constant or decline with age. Thus, plumbers would tend to be savers in the early segments and dissavers later (when their income declines).

5. The difference is because of the definition and measurement of return. In the case of the *WSJ*, they are only referring to the current dividend yield on common stocks versus the promised yield on bonds. In the University of Chicago studies, they are talking about the total rate of return on common stocks, which is the dividend yield plus the capital gain or loss yield during the period. In the long run, the dividend yield has been 4-5 percent and the capital gain yield has averaged about the same. Therefore, it is important to compare

alternative investments based upon total return.

6. The variance of expected returns represents a measure of the dispersion of actual returns around the expected value. The larger the variance is, everything else remaining constant, the greater the dispersion of expectations and the greater the uncertainty, or risk, of the investment. The purpose of the variance is to help measure and analyze the risk associated with a particular investment.

7. An investor's required rate of return is a function of the economy's risk free rate (RFR), an inflation premium that compensates the investor for loss of purchasing power, and a risk premium that compensates the investor for taking the risk. The RFR is the pure time value of money and is the compensation an individual demands for deferring consumption. More objectively, the RFR can be measured in terms of the long-run real growth rate in the economy since the investment opportunities available in the economy influence the RFR. The inflation premium, which can be conveniently measured in terms of the Consumer Price Index, is the additional protection an individual requires to compensate for the erosion in purchasing power resulting from increasing prices. Since the return on all investments is not certain as it is with T-bills, the investor requires a premium for taking on additional risk. The risk premium can be examined in terms of business risk, financial risk, liquidity risk, exchange rate risk and country risk.

8. Three factors that influence the nominal RFR are the real growth rate of the economy, liquidity (i.e., supply and demand for capital in the economy) and the expected rate of inflation. Obviously, the influence of liquidity on the RFR is an inverse relationship, while the real growth rate and inflationary expectations have positive relationships with the nominal RFR - i.e., the higher the real growth rate, the higher the nominal RFR and the higher the expected level of inflation, the higher the nominal RFR.

   It is unlikely that the economy's long-run real growth rate will change dramatically during a business cycle. However, liquidity depends upon the government's monetary policy and would change depending upon what the government considers to be the appropriate stimulus. Besides, the demand for business loans would be greatest during the early and middle part of the business cycle.

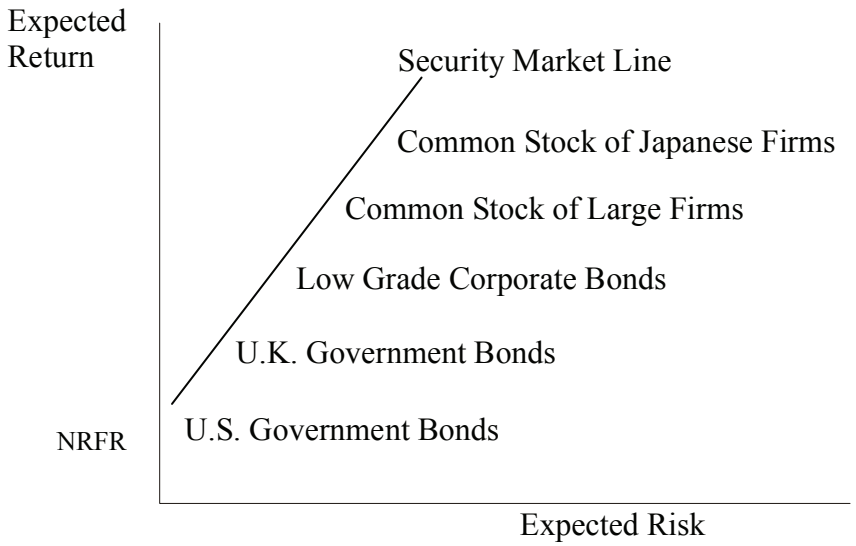
9. The five factors that influence the risk premium on an investment are business risk, financial risk, liquidity risk, exchange rate risk, and country risk.

   Business risk is a function of sales volatility and operating leverage and the combined effect of the two variables can be quantified in terms of the coefficient of variation of operating earnings. Financial risk is a function of the uncertainty introduced by the financing mix. The inherent risk involved is the inability to meet future contractual payments (interest on bonds, etc.) or the threat of bankruptcy. Financial risk is measured in terms of a debt ratio (e.g., debt/equity ratio) and/or the interest coverage ratio. Liquidity risk is the uncertainty an individual faces when he decides to buy or sell an investment. The two uncertainties involved are: (1) how long it will take to buy or sell this asset, and (2) what price will be received. The liquidity risk on different investments can vary substantially (e.g., real estate vs. T-bills). Exchange rate risk is the uncertainty of returns on securities acquired in a different currency. The risk applies to the global

investor or multinational corporate manager who must anticipate returns on securities in light of uncertain future exchange rates. A good measure of this uncertainty would be the absolute volatility of the exchange rate or its beta with a composite exchange rate. Country risk is the uncertainty of returns caused by the possibility of a major change in the political or economic environment of a country. The analysis of country risk is much more subjective and must be based upon the history and current environment in the country.

10. The increased use of debt increases the fixed interest payment. Since this fixed contractual payment will increase, the residual earnings (net income) will become more variable. The required rate of return on the stock will change since the financial risk (as measured by the debt/equity ratio) has increased.

11. According to the Capital Asset Pricing Model, all securities are located on the Security Market Line with securities' risk on the horizontal axis and securities' expected return on its vertical axis. As to the locations of the five types of investments on the line, the U.S. government bonds should be located to the left of the other four, followed by United Kingdom government bonds, low-grade corporate bonds, common stock of large firms, and common stocks of Japanese firms. U.S. government bonds have the lowest risk and required rate of return simply because they virtually have no default risk at all. U.K. Government bonds are perceived to be default risk-free but expose the U.S. investor to exchange rate risk. Low grade corporates contain business, financial, and liquidity risk but should be lower in risk than equities. Japanese stocks are riskier than U.S. stocks due to exchange rate risk.

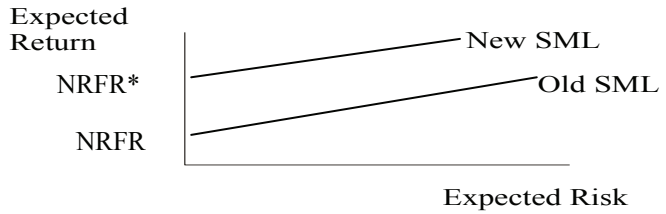


12. If a market's real RFR is, say, 3 percent, the investor will require a 3 percent return on an investment since this will compensate him for deferring consumption. However, if the inflation rate is 4 percent, the investor would be worse off in real terms if he invests at a rate of return of 4 percent - e.g., you would receive $103, but the cost of $100 worth of goods at the beginning of the year would be $104 at the end of the year, which means you could consume less real goods. Thus, for an investment to be desirable, it should have a return of 7.12 percent [(1.03 x 1.04) - 1], or an approximate return of 7 percent (3% + 4%).

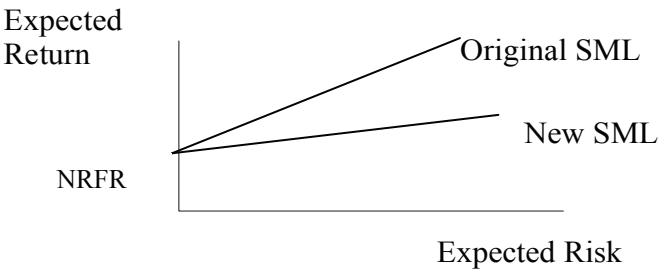
13. Both changes cause an increase in the required return on all investments. Specifically, an increase in the real growth rate will cause an increase in the economy's RFR because of a

higher level of investment opportunities. In addition, the increase in the rate of inflation will result in an increase in the nominal RFR. Because both changes affect the nominal RFR, they will cause an equal increase in the required return on all investments of 5 percent.

The graph should show a parallel shift upward in the capital market line of 5 percent.



14. Such a change in the yield spread would imply a change in the market risk premium because, although the risk levels of bonds remain relatively constant, investors have changed the spreads they demand to accept this risk. In this case, because the yield spread (risk premium) declined, it implies a decline in the slope of the SML as shown in the following graph.



15. The ability to buy or sell an investment quickly without a substantial price concession is known as liquidity. An example of a liquid investment asset would be a United States Government Treasury Bill. A Treasury Bill can be bought or sold in minutes at a price almost identical to the quoted price. In contrast, an example of an illiquid asset would be a specialized machine or a parcel of real estate in a remote area. In both cases, it might take a considerable period of time to find a potential seller or buyer and the actual selling price could vary substantially from expectations.

CHAPTER 1

Answers to Problems

1. $4,000 used to purchase 80 shares = $50 per share

$$\text{HPR} = \frac{(59 \text{ x } 80) + (5 \text{ x } 80)}{4{,}000} = \frac{4{,}720 + 400}{4{,}000} = \frac{5{,}120}{4{,}000} = 1.280$$

$$\text{HPY} = \text{HPR} - 1 = 1.280 - 1 = .280 = 28\%$$

$$\text{HPR (Price Increase Alone)} = \frac{59 \text{ x } 80}{4{,}000} = \frac{4{,}720}{4{,}000} = 1.180$$

$$\text{HPY (Price Increase Alone)} = 1.180 - 1 = .180 = 18\%$$

Therefore: HPY (Total) = HPY (Price Increase) + HPY (Div)
.280 = .180 + HPY (Div)
.10 = HPY (Dividends)

2. $$\text{HPR} = \frac{\text{Ending Value of Investment (including Cash Flows)}}{\text{Beginning Value of Investment}}$$

$$= \frac{39 + 1.50}{34} = \frac{40.50}{34} = 1.191$$

$$\text{HPY} = \text{HPR} - 1 = 1.191 - 1 = .191 = 19.1\%$$

3. $$\text{HPR} = \frac{61 + 3}{65} = \frac{64}{65} = -.985$$

$$\text{HPY} = \text{HPR} - 1 = .985 - 1 = -.015 = -1.5\%$$

4. $$\text{"Real" Rate of Return} = \frac{\text{Holding Period Return}}{1 + \text{Rate of Inflation}} - 1$$

For Problem #1: HPR = 1.191

$$\text{at 4\% inflation:} \ \frac{1.191}{1 + .04} - 1 = \frac{1.191}{1.04} - 1 = 1.145 - 1 = .145 = 14.5\%$$

$$\text{at 8\% inflation:} \ \frac{1.191}{1 + .08} - 1 = \frac{1.191}{1.08} - 1 = 1.103 - 1 = .103 = 10.3\%$$

For Problem #2: HPR = .985

$$\text{at 4\% inflation}: \frac{.985}{1.04} - 1 = .947 - 1 = -.053 = -5.3\%$$

$$\text{at 8\% inflation}: \frac{.985}{1.08} - 1 = .912 - 1 = -.088 = -8.8\%$$

5. $E(R_{MBC}) = (.30)(-.10) + (.10)(0.00) + (.30)(.10) + (.30)(.25)$
$= (-.03) + .000 + .03 + .075 = .075$

6. $E(R_{LCC}) = (.05)(-.60) + (.20)(-.30) + (.10)(-.10) + (.30)(.20) + (.20)(.40) + (.15)(.80)$
$= (-.03) + (-.06) + (-.01) + .06 + .08 + .12 = .16$

7. The Lauren Computer Company presents greater risk as an investment because the range of possible returns is much wider.

8(a). $$\text{Arithemeti c Mean (AM)} = \sum_{i=1}^{n} \frac{HPY_i}{n}$$

$$AM_T = \frac{(.19) + (.08) + (-.12) + (-.03) + (.15)}{5}$$

$$= \frac{.27}{5} = .054$$

$$AM_B = \frac{(.08) + (.03) + (-.09) + (.02) + (.04)}{5}$$

$$= \frac{.08}{5} = .016$$

For Problem #3: HPR = 1.280

$$\text{at 4\% inflation}: \frac{1.280}{1.04} - 1 = 1.231 - 1 = .231 = 23.1\%$$

$$\text{at 8\% inflation}: \frac{1.280}{1.08} - 1 = 1.185 - 1 = .185 = 18.5\%$$

Stock T is more desirable because the arithmetic mean annual rate of return is higher.

8(b). Standard Deviation $(\sigma) = \sqrt{\sum_{i=1}^{n} [R_i - E(R_i)]^2 / n}$

$$\begin{aligned} Variance_T &= (.19-.054)^2 + (.08-.054)^2 + (-.12-.054)^2 + (-.03-.054)^2 + (.15-.054)^2 \\ &= .01850 + .00068 + .03028 + .00706 + .00922 \\ &= .06574 \\ \sigma^2 &= .06574/5 = .01315 \\ \sigma_T &= \sqrt{.01314} = .11467 \end{aligned}$$

8(c). Coefficient of Variation $= \dfrac{\text{Standard Deviation}}{\text{Expected Return}}$

$$CV_T = \frac{.11466}{.054} = 2.123$$

$$CV_B = \frac{.05682}{.016} = 3.5513$$

$$\begin{aligned} \Sigma_B &= (.08-.016)^2 + (.03-.016)^2 + (-.09-.016)^2 + (.02-.016)^2 + (.04-.016)^2 \\ &= .00410 + .00020 + .01124 + .00002 + .00058 \\ &= .01614 \\ \sigma^2 &= .01614/5 = .00323 \\ \sigma_B &= \sqrt{.00323} = .05681 \end{aligned}$$

By this measure, B would be preferable

By this measure, T would be preferable.

8(d). Geometric Mean (GM) = $\pi^{1/n} - 1$

where π = Product of the HRs

$GM_T = [(1.19)\ (1.08)\ (.88)\ (.97)\ (1.15)]^{1/5}$ -1

$= [1.26160]^{1/5} - 1 = 1.04757 - 1 = .04757$

$GM_B = [(1.08)\ (1.03)\ (.91)\ (1.02)\ (1.04)]^{1/5}$ -1

$= [1.07383]^{1/5} - 1 = 1.01435 - 1 = .01435$

Stock T has more variability than Stock B. The greater the variability of returns, the greater the difference between the arithmetic and geometric mean returns.

9. NRFR = (1 + .03) (1 + .04) – 1 = 1.0712 – 1 = .0712
(An approximation would be growth rate plus inflation rate or .03 + .04 = .07.)

10. Return on common stock = (1 + .0712) (1 + .05) – 1
= 1.1248 – 1 = .1248 or 12.48%
(An approximation would be .03 + .04 + .05 = .12 or 12%.)

As an investor becomes more risk averse, the investor will require a larger risk premium to own common stock. As risk premium increases, so too will required rate of return. In order to achieve the higher rate of return, stock prices should decline.

11. Nominal rate on T-bills (or risk-free rate) = (1 + .03) (1 + .05) – 1
= 1.0815 – 1 = .0815 or 8.15%
(An approximation would be .03 + .05 = .08.)

The required rate of return on common stock is equal to the risk-free rate plus a risk premium. Therefore the approximate risk premium for common stocks implied by these data is: .14 - .0815 = .0585 or 5.85%.

(An approximation would be .14 - .08 = .06.)

12. $$\text{Rate of Inflation} = \frac{CPI_{n+1} - CPI_n}{CPI_n}$$

where CPI = the Consumer Price Index

$$\text{Rate of Inflation} = \frac{172 - 160}{160} = \frac{12}{160} = .075$$

$$\text{Real Rate of Return} = \frac{\text{HPR}}{1 + \text{rate of inflation}} - 1$$

$$\text{U.S. Government T - Bills} = \frac{1.055}{1.075} - 1 = .9814 - 1 = -.0186$$

$$\text{U.S. Government LT bonds} = \frac{1.075}{1.075} - 1 = 0$$

$$\text{U.S. Common Stocks} = \frac{1.1160}{1.075} - 1 = 1.0381 - 1 = .0381$$

APPENDIX 1

Answers to Problems

1(a). Expected Return = Σ(Probability of Return)(Possible Return)

$$E(R_{GDC}) = \sum_{i=1}^{n} P_i[R_i]$$

$$= (.25)(-.10) + (.15)(0.00) + (.35)(.10) + (.25)(.25)$$
$$= (-.025) + (.000) + (.035) + (.0625)$$
$$= (.0725)$$

$$\sigma^2 = \sum_{i=1}^{n} P_i[R_i - E(R_i)]^2$$

$$= (.25)(-.100 - .0725)^2 + (.15)(0.00 - .0725)^2 + (.35)(.10 - .0725)^2 + (.25)(.25 - .0725)^2$$
$$= (.25)(.02976) + (.15)(.0053) + (.35)(.0008) + (.25)(.0315)$$
$$= .0074 + .0008 + .0003 + .0079$$
$$= .0164$$

$$\sigma_{GDC} = \sqrt{.0164} = .128$$

1(b). Standard deviation can be used as a good measure of relative risk between two investments that have the same expected rate of return.

1(c). The coefficient of variation must be used to measure the relative variability of two investments if there are major differences in the expected rates of return.

2(a). $E(R_{KCC}) = (.15)(-.60) + (.10)(-.30) + (.05)(-.10) + (.40)(.20) + (.20)(.40) + (.10)(.80)$
$= (-.09) + (-.03) + (-.005) + .08 + .08 + .08 = .115$

$$\sigma^2 = (.15)(-.60 - .115)^2 + (.10)(-.30 - .115)^2 + (.05)(-.10 - .115)^2 + (.40)(.20 - .115)^2 + (.20)(.40 - .115)^2 + (.10)(.80 - .115)^2$$

$$= (.15)(-.715)^2 + (.10)(-.415)^2 + (.05)(-.215)^2 + (.40)(.085)^2 + (.20)(.285)^2 + (.10)(.685)^2$$

$$= (.15)(.5112) + (.10)(.1722) + (.05)(.0462) + (.40)(.0072) + (.20)(.0812) + (.10)(.4692)$$

$$= .07668 + .01722 + .00231 + .00288 + .01624 + .04692$$
$$= .16225$$

$$\sigma_{KCC} = \sqrt{.16225} = .403$$

2(b). Based on $[E(R_i)]$ alone, Kayleigh Computer Company's stock is preferable because of the

higher return available.

2(c). Based on standard deviation alone, the Gray Disc Company's stock is preferable because of the likelihood of obtaining the expected return since it has a lower standard deviation

2(d). $$CV = \frac{\text{Standard Deviation}}{\text{Expected Return}}$$

$$CV_{GDC} = \frac{.128}{.0725} = 1.77$$

$$CV_{KCC} = \frac{.403}{.115} = 3.50$$

Based on CV, Kayleigh Computer Company's stock return has approximately twice the relative dispersion of Gray Disc Company's stock return.

3(a). $$AM_{US} = \frac{.063 + .081 + .076 + .090 + .085}{5} = \frac{.395}{5} = .079$$

$$AM_{UK} = \frac{.150 + .043 + .374 + .192 + .106}{5} = \frac{.865}{5} = .173$$

Standard deviation of U.S. T-bills: 0.92% or 0.0092
Standard deviation of U.K. Common Stock: 11.2% or 0.112

3(b). The average return of U.S. Government T-Bills is lower than the average return of United Kingdom Common Stocks because U.S. Government T-Bills are riskless, therefore their risk premium would equal 0. The U.K. Common Stocks are subject to the following types of risk: business risk, financial risk, liquidity risk, exchange rate risk, (and to a limited extent) country risk. The standard deviation of the T-bills and their range (9% minus 6.3%) is much less than the standard deviation and range (37.4% minus 4.3%) of the U.K. common stock.

3(c). $GM = \pi^{1/n} - 1$

$\pi_{US} = (1.063)(1.081)(1.076)(1.090)(1.085) = 1.462$

$GM_{US} = (1.462)^{1/5} - 1 = 1.079 - 1 = .079$

$\pi_{UK} = (1.150)(1.043)(1.374)(1.192)(1.106) = 2.1727$

$GM_{UK} = (2.1727)^{1/5} - 1 = 1.1679 - 1 = .1679$

In the case of the U.S. Government T-Bills, the arithmetic and geometric means are approximately equal (.079), an indicator of a small standard deviation (which as we saw in 3a equals 0.0092). The geometric mean (.1679) of the U.K. Common Stocks is lower than the arithmetic mean (.173); this is always the case when the standard deviation is non-zero. The difference between the arithmetic and geometric means is larger, the larger the standard

deviation of returns.