Financial Theory and Corporate Policy

FOURTH EDITION

STUDENT SOLUTIONS MANUAL

Thomas E. Copeland
Managing Director of Corporate Finance
Monitor Group, Cambridge, Massachusetts

J. Fred Weston
Professor of Finance Recalled, The Anderson School
University of California at Los Angeles

Kuldeep Shastri
Roger S. Ahlbrandt, Sr. Endowed Chair in Finance
and Professor of Business Administration
Joseph M. Katz Graduate School of Business
University of Pittsburgh

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Case 3

(a) Second order dominance—There is no dominance because although A has a lower variance it also has a lower mean.

(b) First order dominance—Given normal distributions, it is not possible for B to dominate A according to the first order criterion. Figure S3.5 shows an example.

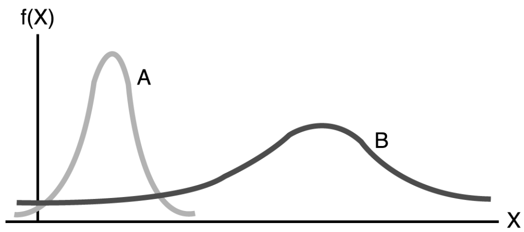


Figure S3.5 First order dominance not possible

13. (a)

Prob X	**X**	**p_iX_i**	**$X_i - E(X)$**	**$p_i(X_i - E(X))^2$**	
.1	−10	−1.0	−16.4	.1(268.96)	= 26.896
.4	5	2.0	−1.4	.4(1.96)	= .784
.3	10	3.0	3.6	.3(12.96)	= 3.888
.2	12	2.4	5.6	.2(31.36)	= 6.272
		E(X) = 6.4			var (X) = 37.840

Prob Y	**Y**	**p_iY_i**	**$Y_i - E(Y)$**	**$p_i(Y_i - E(Y))^2$**	
.2	2	.4	−3.7	.2(13.69)	= 2.738
.5	3	1.5	−2.7	.5(7.29)	= 3.645
.2	4	.8	−1.7	.2(2.89)	= .578
.1	30	3.0	24.3	.1(590.49)	= 59.049
		E(Y) = 5.7			var(Y) = 66.010

X is clearly preferred by *any* risk averse individual whose utility function is based on mean and variance, because X has a higher mean and a lower variance than Y, as shown in Figure S3.6.

(b) Second order stochastic dominance may be tested as shown in Table S3.3 on the following page. Because Σ(F − G) is not less than (or greater than) zero for all outcomes, there is no second order dominance.

Chapter 5
Objects of Choice: Mean-Variance Portfolio Theory

1.

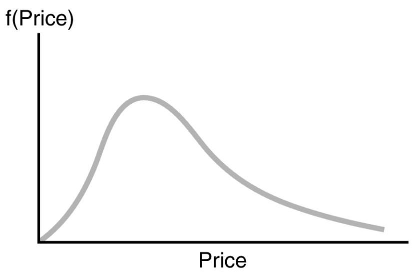


Figure S5.1 Skewed distribution of stock prices

The reason stock prices are skewed right is because theoretically there is no upper bound to the price level a stock can attain, while, with limited liability, the probability distribution is bounded on the left by P = 0.

2. The equation for correlation between x and y,

$$r_{x,y} = \frac{\text{cov}(x, y)}{\sigma_x \sigma_y}$$

requires the calculation of var(x), var(y), and cov(x, y). Given y = a – bx,

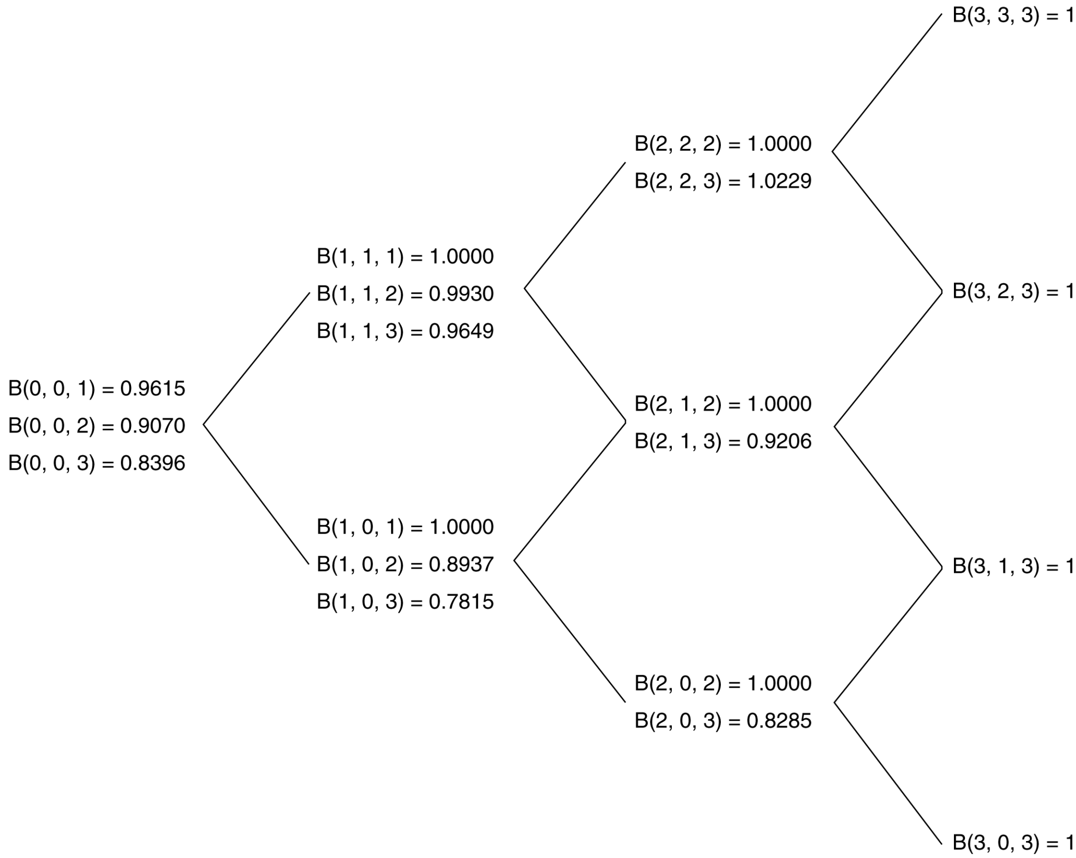
$$\begin{aligned}
\text{var}(y) &= \text{var}(a - bx) \\
&= E\{[a - bx - E(a - bx)]^2\} \\
&= E\{[a - bx - a - E(-bx)]^2\} \\
&= E\{[-bx + bE(x)]^2\} \\
&= (-b)^2 E\{[x - E(x)]^2\} \\
&= b^2 \text{ var}(x)
\end{aligned}$$

Therefore, because the standard deviation must be positive

$$\sigma_y = b\sigma_x$$

$$\text{and} \quad \sigma_x\sigma_y = b\sigma_x^{\ 2}$$

Applying the same logic and process at different nodes yields the following tree of bond prices:



5. There are several possible answers to this question. First, using the insight provided by Samuelson in Eq. (8.30), we note that the variance of futures contracts declines for longer-lived contracts. Far distant contracts have relatively lower variance because autoregressive prices have a long interval to correct themselves. As a result, there may be no market for long-lived contracts because their prices would not fluctuate enough to create any trading volume. A second, and related, answer is that hedgers may have no need to protect themselves against price fluctuations more than 18 months in the future.

6. (a) The first step is to compare the product of short-term rates against the longer-term rate.

$$(1.10)^{167/360} > (1.125)^{90/360}(1.06)^{77/360}$$

$$1.045205 > (1.029884)\ (1.012541)$$

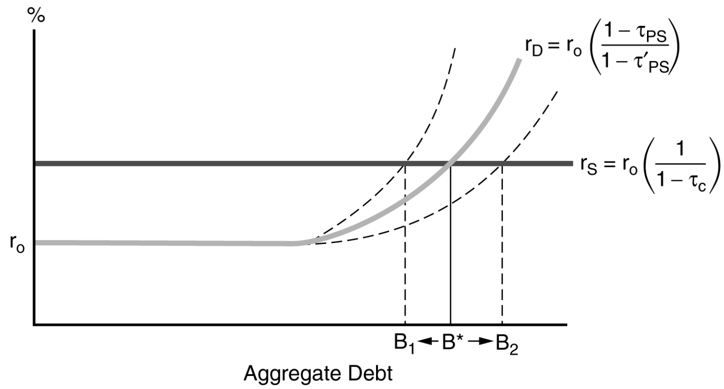
$$1.045205 > 1.042799$$

The results tell us that a higher yield can be obtained if we are long in the 167 day T-bill and short in the futures contract and the short-term (77-day) T-bill.

(b) To make a riskless arbitrage profit we need to borrow enough to purchase one futures contract that will deliver a $1,000,000 face value 90-day T-bill on March 22. If the 167-day T-bill yields 10 percent, it costs

$$\begin{aligned} PV &= \$1{,}000{,}000(1.10)^{-167/360} \\ &= \$1{,}000{,}000(.95674983) \\ &= \$956{,}749.83 \end{aligned}$$

(b) Figure S15.2 shows the supply and demand curves for aggregate debt.



r_D = demand for debt
r_S = supply of debt
r_o = rate paid on debt of tax-free institutions

Figure S15.2 Supply and Demand Curves for Aggregate Debt

If the effective tax on income from shares decreases, then we might expect the aggregate demand for debt to decline because equity capital is relatively more attractive. This, in fact, is the more likely effect of the proposed tax changes because the capital gains tax can be deferred, or offset. Hence, one might expect the reduction in the dividend tax to be overriding. The result would be to reduce the aggregate amount of debt in equilibrium from B^* to B_1. Of course, if the effective tax on income from shares increases, we would observe the opposite result, namely, an increase in aggregate debt from B^* to B_2.

6. (a) The cost of capital, WACC, is given by equation 15.19:

$$\text{WACC} = (1-\tau_c)k_b\left(\frac{B}{B+S}\right)+k_s\left(\frac{S}{B+S}\right)$$

k_s can be found by the equation for the security market line, assuming a market in equilibrium, where

$$k_s = R_f + (E(R_m) - R_f)\beta$$

For firm B:

$$k_s = .06 + (.12 - .06)\ (1)$$
$$= .12$$

WACC (B) = .12 because B is an all-equity firm.
For firm C:

$$k_s = .06 + (.12 - .06)1.5$$
$$= .15$$
$$(1 - \tau_c)\ k_b = R_f\ (1 - \tau_c)$$
$$= .06\ (.5)$$
$$= .03$$

15. (a) Let X be the amount of FC which, when invested, will equal FC 380,000 in 6 months. Then,

$$X[1 + (0.08/2)(1 - 0.4)] = \text{FC } 380{,}000$$
$$X(1.024) = \text{FC } 380{,}000$$
$$X = \text{FC } 371{,}093.75$$

If FC 371,094 is invested in the foreign country today, it will yield FC 380,000 in six months. The amount that must be borrowed in dollars today to convert to FC is

$$\text{FC } 371{,}094/(\text{FC } 2.00/\$) = \$185{,}547$$

The net cost (or opportunity lost) that results from this $185,547 investment is equal to the amount Transcorp could have earned if the dollars had been invested in the U.S.

$$X = [1 + (0.12/2)(1 - .04)](185{,}547)$$
$$= (1.036)(185{,}547)$$
$$= \$192{,}227 \text{ net cost}$$

(b) If payment were made immediately, Transcorp would pay

$$380{,}000/(\text{FC } 2.00/\$) = \$190{,}000$$

The difference between this amount and their actual cost, including opportunity loss, is $192,227 – 190,000 = $2,227. This represents an insurance premium against a rise in the FC rate while Transcorp delays six months in making the FC payment.

(c)

$$E_f F_0 + (E_f - E_0)\ F_0\ (\tau_{US}) = \$192{,}227$$
$$380{,}000\ E_f + (0.4)(380{,}000)\ E_f - (0.5)(380{,}000)(0.4) = \$192{,}227$$
$$380{,}000\ E_f + 152{,}000\ E_f - 76{,}000 = 192{,}227$$
$$532{,}000\ E_f = 268{,}227$$
$$E_f = \$0.5042/\text{FC}$$

Transcorp would go long in FC forward to hedge their position, and insure payment abroad in six months.

(d) The speculator would short the FC forward. If the speculator receives a premium for his short position then $E_f > E_1$, i.e., he sells at a higher forward value of FC relative to the future expected spot rate. E.g., $E_1 = 0.5042$, $E_f = 0.505$.