CHAPTER 26: THE PROCESS OF PORTFOLIO MANAGEMENT

1. a. i. Return Requirement: IPS Y has the appropriate language. Since the Plan is currently under-funded, the primary objective should be to make the pension fund financially stronger. The risk inherent in attempting to maximize total returns would be inappropriate.

    ii. Risk Tolerance: IPS Y has the appropriate language. Because of the fund's under-funded status, the Plan has limited risk tolerance; should the fund incur a substantial loss, payments to beneficiaries could be jeopardized.

    iii. Time Horizon: IPS Y has the appropriate language. Although going concern pension plans usually have a long time horizon, the Acme plan has a shorter time horizon because of the reduced retirement age and the relatively high median age of the workforce.

    iv. Liquidity: IPS X has the appropriate language. Because of the early retirement feature starting next month and the age of the work force (which indicates an increasing number of retirees in the near future), the Plan needs a moderate level of liquidity in order to fund monthly benefit payments.

    b. The current portfolio is the most appropriate choice for the pension plan's asset allocation. The current portfolio offers:
    i. An expected return that exceeds the Plan's return requirement;
    ii. An expected standard deviation that only slightly exceeds the Plan's target; and,
    iii. A level of liquidity that should be sufficient for future needs.

    The higher expected return will help the Plan's under-funded status somewhat, and the change in the fund's risk profile will be minimal. The portfolio has significant allocations to U.K. bonds (42 percent) and large-cap equities (13 percent), in addition to cash (5 percent). The availability of these highly liquid assets should be sufficient, particularly in view of the stable income flows from these investments, to fund monthly benefit payments when the early retirement feature takes effect next month.

    The Graham portfolio offers:
    i. An expected return that is slightly below the Plan's requirement;
    ii. An expected standard deviation that is substantially below the Plan's target; and,
    iii. A level of liquidity that should be more than sufficient for future needs.
    Given the Plan's under-funded status, the portfolio's level of risk is unacceptable.

The Michael portfolio offers:
i. An expected return that is substantially above the Plan's requirement;
ii. An expected standard deviation that far exceeds the Plan's target; and
iii. A level of liquidity that should be sufficient for future needs.

Given the Plan's under-funded status, the portfolio's level of risk is unacceptable.

2. c. Liquidity

3. b. Organizing the management process itself.

4. a. An approach to asset allocation that GSS could use is the one detailed in the chapter. It consists of the following steps:
1. Specify asset classes to be included in the portfolio. The major classes usually considered are the following:
> Money market instruments (usually called cash)
> Fixed income securities (usually called bonds)
> Stocks
> Real estate
> Precious metals
> Other
2. Specify capital market expectations. This step consists of using both historical data and economic analysis to determine your expectations of future rates of return over the relevant holding period on the assets to be considered for inclusion in the portfolio.
3. Derive the efficient portfolio frontier. This step consists of finding portfolios that achieve the maximum expected return for any given degree of risk.
4. Find the optimal asset mix. This step consists of selecting the efficient portfolio that best meets your risk and return objectives while satisfying the constraints you face.

b. A guardian investor typically is an individual who wishes to preserve the purchasing power of his assets. Extreme guardians would be exclusively in AAA short term credits. GSS should first determine how long the time horizon is and how high the return expectations are. Assuming a long time horizon and 8-10% return (pretax) expectations, the portfolio could be allocated 30-40% bonds, 30-40% stocks, and modest allocations to the other asset groups.

5. a. OBJECTIVES
1. *Return*

The required total rate of return for the JU endowment fund is the sum of the spending rate and the expected long-term increase in educational costs:

Spending rate = $126 million (current spending need) divided by

($2,000 million current fund balance less $200 million library

payment)

= $126 million/$1,800 million = 7 percent

The expected educational cost increase is 3 percent. The sum of the two components is 10 percent. Achieving this relatively high return would ensure that the endowment's real value is maintained.

2. *Risk*
Evaluation of risk tolerance requires an assessment of both the ability and the willingness of the endowment to take risk.

Ability: Average Risk
- Endowment funds are long-term in nature, having infinite lives. This long time horizon by itself would allow for above-average risk.
- However, creative tension exists between the JU endowment's demand for high current income to meet immediate spending requirements and the need for long-term growth to meet future requirements. This need for a spending rate (in excess of 5 percent) and the university's heavy dependence on those funds allow for only average risk.

Willingness: Above Average Risk
- University leaders and endowment directors have set a spending rate in excess of 5 percent. To achieve their 7 percent real rate of return, the fund must be invested in above-average risk securities. Thus, the 7 percent spending rate indicates a willingness to take above-average risk.
- In addition, the current portfolio allocation, with its large allocations to direct real estate and venture capital, indicates a willingness to take above-average risk.
Taking both ability and willingness into consideration, the endowment's risk tolerance is best characterized as "above average."

CONSTRAINTS

1. *Time Horizon.*
A two-stage time horizon is needed. The first stage recognizes short-term liquidity constraints ($200 million library payment in eight months). The second stage is an infinite time horizon (endowment funds are established to provide permanent support).

2. *Liquidity.*
Generally, endowment funds have long time horizons and little liquidity is needed in excess of annual distribution requirements.

However, the JU endowment requires liquidity for the upcoming library payment in addition to the current year's contribution to the operating budget. Liquidity needs for the next year are:

Library Payment	+$200 million
Operating Budget Contribution	+$126 million
Annual Portfolio Income	−$29 million
Total	+$297 million

Annual portfolio income =

$(0.04 \times \$40$ million$) + (0.05 \times \$60$ million$) + (0.01 \times \$300$

million$)$

$+ (0.001 \times \$400$ million$) + (0.03 \times \$700$ million$) = \$29$ million

3. *Taxes.*
U.S. endowment funds are tax-exempt.

4. *Legal/Regulatory.*
U.S. endowment funds are subject to predominantly state (but some federal) regulatory and legal constraints, and standards of prudence generally apply. Restrictions imposed by Bremner may pose a legal constraint on the fund (no more than 25 percent of the initial Bertocchi Oil and Gas shares may be sold in any one-year period).

5. *Unique Circumstances.*
Only 25 percent of donated Bertocchi Oil and Gas shares may be sold in any one-year period (constraint imposed by donor). A secondary consideration is the need to budget the one-time $200 million library payment in eight months.

b. U.S. Money Market Fund: 15% (Range: 14% - 17%)
Liquidity needs for the next year are:

Library payment	+$200 million
Operating budget contribution	+$126 million
Annual portfolio income	−$29 million
Total	+$297 million

Total liquidity of at least $297 million is required (14.85 percent of current endowment assets). Additional allocations (more than 2 percent above the suggested 15 percent) would be overly conservative. This cushion should be sufficient for any transaction needs (i.e., mismatch of cash inflows/outflows).

Intermediate Global Bond Fund: 20% (Range: 15% 25%)
To achieve a 10 percent portfolio return, the fund needs to take above average risk (e.g., 20 percent in Global Bond Fund and 30 percent in Global Equity Fund). An allocation below 15 percent would involve taking unnecessary risk that would put the safety and preservation of the endowment fund in jeopardy. An allocation in the 21 percent to 25

percent range could still be tolerated because the slight reduction in portfolio expected return would be partially compensated by the reduction in portfolio risk. An allocation above 25 percent would not satisfy the endowment fund return requirements.

Global Equity Fund: 30% (Range: 25% - 35%)
To achieve a 10 percent portfolio return, the fund needs to take above average risk (e.g., 30 percent in Global Equity Fund and 20 percent in Global Bond Fund). An allocation above 35 percent would involve taking unnecessary risk that would put the safety and preservation of the endowment fund in jeopardy. An allocation in the 25 percent to 29 percent range could still be tolerated, as the slight reduction in portfolio expected return would be partially compensated by the reduction in portfolio risk. An allocation below 25 percent would not satisfy the endowment fund return requirements.

Bertocchi Oil and Gas Common Stock: 15%
There is a single issuer concentration risk associated with the current allocation, and a 25 percent reduction ($100 million), which is the maximum reduction allowed by the donor, is required ($400 million − $100 million = $300 million remaining).

Direct Real Estate: 10%

Venture Capital: 10%

The suggested allocations (point estimates) would allow the JU endowment fund to meet the 10 percent return requirement, calculated as follows:

Asset	Suggested Allocation	Expected Return	Weighted Return
U.S. Money Market Fund	0.15	4.0%	0.60%
Intermediate Global Bond Fund	0.20	5.0%	1.00%
Global Equity Fund	0.30	10.0%	3.00%
Bertocchi Common Stock	0.15	15.0%	2.25%
Direct Real Estate	0.10	11.5%	1.15%
Venture Capital	0.10	20.0%	2.00%
Total	1.00		10.000%

The allowable allocation ranges, taken in proper combination, would also be consistent with the 10 percent return requirement.

6. a. *Overview.* Fairfax is 58 years old and has seven years until a planned retirement. She has a fairly lavish lifestyle but few money worries.

Her large salary pays all current expenses, and she has accumulated $2 million in cash equivalents from savings in previous years. Her health is excellent, and her health insurance coverage will continue after retirement and is employer paid. While Fairfax's job is a high-level one, she is not well versed in investment matters and has had the good sense to connect with professional counsel to get started on planning for her investment future, a future that is complicated by ownership of a $10 million block of company stock that, while listed on the NYSE, pays no dividends and has a zero-cost basis for tax purposes. All salary, investment income (except interest on municipal bonds) and realized capital gains are taxed to Fairfax at a 35 percent rate; this tax rate and a 4 percent inflation rate are expected to continue into the future. Fairfax would accept a 3 percent real, after-tax return from the investment portfolio to be formed from her $2 million in savings ("the Savings Portfolio") if that return could be obtained with only modest portfolio volatility (i.e., less than a 10 percent annual decline). She is described as being "conservative in all things."

Objectives

- Return Requirement. Fairfax's need for portfolio income begins seven years from now, at the date of retirement. The investment focus for her Savings Portfolio should be on growing the portfolio's value in the interim in a way that provides protection against loss of purchasing power. Her 3% real, after-tax return preference implies a gross total return requirement of at least 10.8%, assuming her investments are fully taxable (as is the case now) and assuming 4% inflation and a 35 percent tax rate. For Fairfax to maintain her current lifestyle, then, at retirement, she would have to generate inflation-adjusted annual income of:

$$\$500{,}000 \times 1.04^7 = \$658{,}000$$

If the market value of Reston's stock does not change, and if she is able to earn a 10.8% return on the Savings Portfolio (or 7% nominal after-tax return), then, by retirement age, she should accumulate:

$$\$10{,}000{,}000 + (\$2{,}000{,}000 \times 1.07^7) = \$13{,}211{,}500$$

To generate $658,000 per year, a 5.0% return on the $13,211,500 would be needed.

- Risk Tolerance. The information provided indicates that Fairfax is quite risk averse; she does not want to experience a decline of more than 10% in the value of the Savings Portfolio in any given year. This would indicate that the portfolio should have below average risk exposure in order to minimize its downside volatility. In terms of overall wealth, Fairfax could afford to take more than average risk, but because of her preferences and the non-diversified nature of the total portfolio, a below-average risk objective is appropriate for the Savings Portfolio. It should be noted, however, that truly meaningful statements about the risk of Fairfax's total portfolio are tied to assumptions regarding both the volatility of Reston's stock (if it is retained) and when and at what price the Reston stock will be sold. Because the Reston holding constitutes 83% of Fairfax's total portfolio, it will largely determine the risk she actually experiences as long as this holding remains intact.

Constraints

- Time Horizon. Two time horizons are applicable to Fairfax's life. The first time horizon represents the period during which Fairfax should set up her financial situation in preparation for the balance of the second time horizon, her retirement period of indefinite length. Of the two horizons, the longer term to the expected end of her life is the dominant horizon because it is over this period that the assets must fulfill their primary function of funding her expenses, as an annuity, in retirement.

- Liquidity. With liquidity defined either as income needs or as cash reserves to meet emergency needs, Fairfax's liquidity requirement is minimal. Five hundred thousand dollars of salary is available annually, health cost concerns are nonexistent, and we know of no planned needs for cash from the portfolio.

- Taxes. Fairfax's taxable income (salary, taxable investment income, and realized capital gains on securities) is taxed at a 35% rate. Careful tax planning and coordination with investment planning is required. Investment strategy should include seeking income that is sheltered from taxes and holding securities for lengthy time periods in order to produce larger after-tax-returns. Sale of the Reston stock will have sizeable tax consequences because Fairfax's cost basis is zero; special planning will be needed for this eventuality. Fairfax may want to consider some form of charitable giving, either during her lifetime or at death. She has no immediate family, and we know of no other potential gift or bequest recipients.

- Laws and Regulations. Fairfax should be aware of, and abide by, any securities (or other) laws or regulations relating to her "insider" status at Reston and her holding of Reston stock. Although there is no trust instrument in place, if Fairfax's future investing is handled by an investment advisor, the responsibilities associated with the Prudent Person Rule will come into play, including the responsibility for investing in a diversified portfolio. Also, she has a need to seek estate planning legal assistance, even though there are no apparent gift or bequest recipients.

- Unique Circumstances and/or Preferences. The value of the Reston stock dominates the value of Fairfax's portfolio. A well-defined exit strategy needs to be developed for the stock as soon as is practical and appropriate. If the value of the stock increases, or at least does not decline before it is liquidated, Fairfax's present lifestyle can be maintained after retirement with the combined portfolio. A significant and prolonged setback for Reston Industries, however, could have disastrous consequences. Such circumstances would require a dramatic downscaling of Fairfax's lifestyle or generation of alternate sources of income in order to maintain her current lifestyle. A worst-case scenario might be characterized by a 50% drop in the market value of Reston's stock and sale of that stock to diversify the portfolio, where the sale proceeds would be subject to a 35% tax rate. In this scenario, the net proceeds of the Reston part of the portfolio would be:

$$\$10,000,000 \times 0.5 \times (1 - 0.35) = \$3,250,000$$

When added to the Savings Portfolio, total portfolio value would be $5,250,000. For this portfolio to generate $658,000 in income, a 12.5% return would be required.

Synopsis. The policy governing investment in Fairfax's Savings Portfolio shall put emphasis on realizing a 3% real, after-tax return from a mix of high-quality assets with less than average risk. Ongoing attention shall be given to Fairfax's tax planning and legal needs, her progress toward retirement, and the value of her Reston stock. The Reston stock holding is a unique circumstance of decisive significance in this situation. Developments should be monitored closely, and protection against the effects of a worst-case scenario should be implemented as soon as possible.

b. *Critique*. The Coastal proposal produces a real, after-tax expected return of approximately 5.18%, which exceeds the 3% level sought by Fairfax. The expected return for this proposal can be calculated by first subtracting the tax-exempt yield from the total current yield:

$$4.9\% - 0.55\% = 4.35\%$$

Next, convert this to an after-tax yield:

$$4.35\% \times (1 - 0.35) = 2.83\%$$

The tax exempt income is then added back to the total:

$$2.83\% + 0.55\% = 3.38\%$$

The appreciation portion of the return (5.8%) is then added to the after-tax yield to get the nominal portfolio return:

$$3.38\% + 5.80\% = 9.18\%$$

Finally, the 4% inflation rate is subtracted to produce the expected real after-tax return:

$$9.18\% - 4.0\% = 5.18\%$$

This result can also be obtained by computing these returns for each of the individual holdings, weighting each result by the portfolio percentage and then adding to derive a total portfolio result.

From the data available, it is not possible to determine specifically the inherent degree of portfolio volatility. Despite meeting the return criterion, the allocation is neither realistic nor, in its detail, appropriate to Fairfax's situation in the context of an investment policy usefully applicable to her. The primary weaknesses are the following:

- Allocation of Equity Assets. Exposure to equity assets will be necessary in order to achieve the return requirements specified by Fairfax; however, greater diversification of these assets among other equity classes is needed to produce a more efficient, potentially less volatile portfolio that would meet both her risk tolerance parameters and her return requirements. An allocation that focuses equity investments in U.S. large-cap and/or small-cap holdings and also includes smaller international and Real Estate Investment Trust exposure is more likely to achieve the return and risk tolerance goals. If more information were available concerning the returns and volatility of the Reston stock, an argument could be made that this holding is the U.S. equity component of her portfolio. But the lack of information on this issue precludes taking it into account for the Savings Portfolio allocation and creates the need for broader equity diversification.

- Cash allocation. Within the proposed fixed-income component, the 15% allocation to cash is excessive given the limited liquidity requirement and the low return for this asset class.

- Corporate/Municipal Bond Allocation. The corporate bond allocation (10 percent) is inappropriate given Fairfax's tax situation and the superior after-tax yield on municipal bonds relative to corporate (5.5% vs. 4.9% after-tax return).

- Venture Capital Allocation. The allocation to venture capital is questionable given Fairfax's policy statement indicating that she is quite risk averse. Although venture capital may provide diversification benefits, venture capital returns historically have been more volatile than other risky assets such as U.S. large- and small-cap stocks. Hence, even a small percentage allocation to venture capital may be inappropriate.

- Lack of Risk/Volatility Information. The proposal concentrates on return expectations and ignores risk/volatility implications. Specifically, the proposal should have addressed the expected volatility of the entire portfolio to determine whether it falls within the risk tolerance parameters specified by Fairfax.

c. i. Fairfax has stated that she is seeking a 3% real, after-tax return. Table 26G provides nominal, pre-tax figures, which must be adjusted for both taxes and inflation in order to ascertain which portfolios meet Fairfax's return objective. A simple solution is to subtract the municipal bond return component from the stated return, then subject the resulting figure to a 35% tax rate, and then add back tax-exempt municipal bond income. This produces a nominal, after-tax return. Finally, subtract 4% percent inflation to arrive at the real, after-tax return. For example, Allocation A has a real after-tax return of 3.4%, calculated as follows:

$$\{[0.099 - (0.072 \times 0.4)] \times (1\text{-}0.35)\} + (0.072 \times 0.4) - 0.04 = 3.44\%$$

Alternatively, this can be calculated as follows: multiply the taxable returns by their respective allocations, sum these products, adjust for the tax rate, add the result to the product of the nontaxable (municipal bond) return and its allocation, and deduct the inflation rate from this sum. For Allocation A:

$$[(0.045 \times 0.10) + (0.13 \times 0.20) + (0.15 \times 0.10) + (0.15 \times 0.10) + (0.10 \times 0.10)] \times (1 - 0.35) + [(0.072 \times 0.4)] - 0.04 = 3.46\%$$

		Allocation			
Return Measure	A	B	C	D	E
Nominal Return	9.9%	11.0%	8.8%	14.4%	10.3%
Real After-Tax Return	3.5%	3.1%	2.5%	5.3%	3.5%

Table 26G also provides after-tax returns that could be adjusted for inflation and then used to identify those portfolios that meet Fairfax's return guidelines.

Allocations A, B, D, and E meet Fairfax's real, after-tax return objectives.

ii. Fairfax has stated that a worst case return of –10% in any 12-month period would be acceptable. The expected return less two times the portfolio risk (expected standard deviation) is the relevant risk tolerance measure. In this case, three allocations meet the criterion: A, C, and E.

	Allocation				
Parameter	A	B	C	D	E
Expected Return	9.9%	11.0%	8.8%	14.4%	10.3%
Exp. Std. Deviation	9.4%	12.4%	8.5%	18.1%	10.1%
Worst Case Return	−8.9%	−13.8%	−8.2%	−21.8%	−9.9%

d. i. The Sharpe Ratio for Allocation D, using the cash equivalent rate of 4.5 percent as the risk-free rate, is: $(0.144 – 0.045)/0.181 = 0.547$

ii. The two allocations with the best Sharpe Ratios are A and E; the ratio for each of these allocations is 0.574.

e. The recommended allocation is A. The allocations that meet both the minimum real, after-tax objective and the maximum risk tolerance objective are A and E. These allocations have identical Sharpe Ratios and both of these allocations have large positions in municipal bonds. However, Allocation E also has a large position in REITs, whereas the comparable equity position for Allocation A is a diversified portfolio of large and small cap domestic stocks. Because of the diversification value of the large and small stock positions in Allocation A as opposed to the specialized or non-diversified nature of REIT stocks and their limited data history, one would have greater confidence that the expectational data for the large- and small- cap stock portfolios will be realized than for the REIT portfolio.

7.   a.   The key elements that should determine the foundation's grant-making (spending) policy are:

1. Average expected inflation over a long time horizon;
2. Average expected nominal return on the endowment portfolio over the same long horizon; and,
3. The 5%-of-asset-value payout requirement imposed by tax authorities as a condition for ongoing U.S. tax exemption, a requirement that is expected to continue indefinitely.

To preserve the real value of its assets and to maintain its spending in real terms, the foundation cannot pay out more, on average over time, than the real return it earns from its investment portfolio, since no fund-raising activities are contemplated. In effect, the portion of the total return representing the inflation rate must be retained and reinvested if the foundation's principal is to grow with inflation and, thus, maintain its real value and the real value of future grants.

b.   *Objectives*

Return Requirement: Production of current income, the committee's focus before Mr. Franklin's gift, is no longer a primary objective, given the increase in the asset base and the Committee's understanding that investment policy must accommodate long-term as well as short-term goals. The need for a minimum annual payout equal to 5% of assets must be considered, as well as the need to maintain the real value of these assets. A total return objective (roughly equal to the grant rate plus the inflation rate, but not less than the 5% required for maintenance of the foundation's tax-exempt status) is appropriate.

Risk Tolerance: The increase in the foundation's financial flexibility arising from Mr. Franklin's gift and the committee's spending policy change have increased the foundation's ability to assume risk. The organization has a more or less infinite expected life span and, in the context of this long-term horizon, has the ability to accept the consequences of short-term fluctuations in asset values. Moreover, adoption of a clear-cut spending rule will permit cash flows to be planned with some precision, adding stability to annual budgeting and reducing the need for precautionary liquidity. Overall, the foundation's risk tolerance is above average and oriented to long-term considerations.

Constraints

Liquidity Requirements: Liquidity needs are low, with little likelihood of unforeseen demands requiring either forced asset sales or immense cash. Such needs as exist, principally for annual grant-making, are known in advance and relatively easy to plan for in a systematic way.

Time Horizon: The foundation has a virtually infinite life; the need to plan for future as well as current financial demands justifies a long-term horizon with perhaps a five year cycle of planning and review.

Taxes: Tax-exempt under present U.S. law if the annual minimum payout requirement (currently 5% of asset value) is met.

Legal and Regulatory: Governed by state law and Prudent Person standards; ongoing attention must be paid to maintaining the tax-exempt status by strict observance of IRS and any related Federal regulations.

Unique Circumstances: The need to maintain real value after grants is a key consideration, as is the 5% of assets requirement for tax exemption. The real return achieved must meet or exceed the grant rate, with the 5% level a minimum requirement.

Narrative: Investment actions shall take place in a long-term, tax-exempt context, reflect above average risk tolerance, and emphasize production of real total returns, but with at least a 5% nominal return.

c.   To meet requirements of this scenario, it is first necessary to identify a spending rate that is both sufficient (i.e., 5% or higher in nominal terms) and feasible (i.e., prudent and attainable under the circumstances represented by the Table 26H data and the empirical evidence of historical risk and return for the various asset classes). The real return from the recommended allocation should be shown to equal or exceed the minimum payout requirement (i.e., equal to or greater than 5% in nominal terms).

The allocation philosophy will reflect the foundation's need for real returns at or above the grant rate, its total return orientation, its above average risk tolerance, its low liquidity requirements, and its tax exempt status. While the Table 26H data and historical experience provide needed inputs to the process, several generalizations are also appropriate:

1. Allocations to fixed income instruments will be less than 50% as bonds have provided inferior real returns in the past, and while forecasted real returns from 1993 to 2000 are higher, they are still lower than for stocks. Real return needs are high and liquidity needs are low. Bonds will be included primarily for diversification and risk reduction purposes. The ongoing cash flow from bond portfolios of this size should easily provide for all normal working capital needs.

2. Allocations to equities will be greater than 50%, and this asset class will be the portfolio's "work horse asset." Expected and historical real returns are high, the horizon is long, risk tolerance is above average, and taxes are not a consideration.

3. Within the equity universe there is room in this situation for small cap as well as large cap issues, for international as well as domestic issues and, perhaps, for venture capital investment as well.

Diversification will contribute to risk reduction, and total return could be enhanced. All could be included.

4. Given its value as an alternative to stocks and bonds as a way to maintain real return and provide diversification benefits, real estate could be included in this portfolio. In a long term context, real estate has provided good inflation protection, helping to protect real return production.

An example of an appropriate, modestly aggressive allocation is shown below. Table 26H contains an array of historical and expected return data which was used to develop real return forecasts. In this case, the objective was to reach a spending level in real terms as close to 6% as possible, a level appearing to meet the dual goals of the committee and that is also feasible. The actual expected real portfolio return is 5.8%.

Asset Class	Intermediate Term Forecast of Real Returns	Recommended Allocation	Real Return Contribution
Cash (U.S.)			
T bills	0.7%	*0%	
Bonds:			
Intermediate	2.3	5	0.115%
Long	4.2	10	0.420
Treasury			
Corporate	5.3	10	0.530
International	4.9	10	0.490
Stocks			
Large Cap	5.5	30	1.650
Small Cap	8.5	10	0.850
International	6.6	10	0.660
Venture Capital	12.0	5	0.600
Real Estate	5.0	10	0.500
Total Exp. Return		100%	5.815%

*No cash is included because ongoing cash flow from the portfolio should be sufficient to meet all normal working capital needs.

8. You would advise them to exploit all available retirement tax shelters, such as 403b, 401k, Keogh plans and IRAs. Since they will not be taxed on the income earned from these accounts until they withdraw the funds, they should avoid investing in tax-preferred instruments like municipal bonds. If they are very risk-averse, they should consider investing a large proportion of their funds in inflation-indexed CDs, which offer a riskless real rate of return.

9. a. Return Requirement:

New objective. A total return objective of 7 percent before tax is sufficient to meet Claire Pierce's educational, housing, and retirement goals. If the portfolio earns a total return of 7 percent annually, the value at retirement ($3.93 million) should be adequate to meet ongoing spending needs at that time ($180,000 after tax = $257,143 before tax = 6.6 percent spending rate) and to fund all of Pierce's extraordinary needs (college and homebuilding costs) in the meantime. The million dollar gifts to her children are unrealistic goals that she should be encouraged to modify or abandon.

Weakness of old objective. The current policy is vague and states only a low return requirement, which contradicts the aggressive, unrealistic goal of gifting $2 million to her children. The current policy focuses on the latter goal without considering her retirement needs or her plan to build a house. Thus it does not take a total return-based, comprehensive approach to the return objective.

Risk Tolerance
New objective. Pierce has explicitly stated her limited (below average) willingness to take risk. After losing a substantial amount in the last two years, she does not want her assets to decrease in value by more than 10 percent in any subsequent year. After considering her goals, Pierce would seem to have an average ability to take risk. Her portfolio has some flexibility, as her expected return objective of 7 percent will meet her goals of funding her children's education, building her "dream house," and funding her retirement. Taken together, however, her risk tolerance is below average. Pierce should be provided guidance in order to help her understand that she has greater ability to take risk than she believes.

Weakness of old objective. Although the current IPS indicates Pierce's desire to invest conservatively, it does not address her ability to take risk.

b. Time Horizon
New constraint statement. Her time horizon is multi-stage. The time horizon could appropriately be described as:
- two-stage (the next 20 years, pre-retirement; and beyond 20 years, post-retirement); or,
- three-stage (the next 15 pre-retirement years defined by work/housing and college costs; the subsequent 5 pre-retirement years defined by work; and beyond 20 years, post-retirement); or,
- three-stage (the next 5 pre-retirement years defined by work/housing costs; the subsequent 15 pre-retirement years defined by work/college costs; and beyond 20 years, post-retirement).

Weakness of old constraint. The current IPS does not recognize the multi-stage time horizon issues.

Liquidity

New constraint statement. There is only a minor liquidity need ($18,000 in present value terms) to provide for education expenses for her daughter next year. After that, there are no additional liquidity needs for the subsequent five years. Only then ($375,000 in present value terms, for home construction) and in years 11 through 14 ($91,000 in present value terms, for son's education) are there significant liquidity concerns. The portfolio need not consider possible liquidity concerns with respect to the million-dollar gift for each child, because this is not a realistic goal.

Weakness of old constraint statement. The current policy overstates the liquidity needed to fund the educational expenses. These expenses are either minor relative to the size of the portfolio or not a current liquidity concern.

Taxes

New constraint statement. Taxes are a critical concern, for two reasons. First, taxes are an important consideration in her retirement planning, because post retirement expenditures are after tax. Second, taxes are an important consideration in her investment strategies because taxes are a potential drag on performance. Potential strategies to mitigate this second concern include a low turnover approach to equity investment and investing in municipal bonds (income exempt from income taxes).

Weakness of old constraint statement. The current policy only superficially addresses her tax status by suggesting that she hold only assets that generate little or no taxable income, as opposed to considering either tax minimization strategies or assets that provide good after-tax total returns. The current policy is also inconsistent with her stated desire to assume that all returns are fully taxable.

Unique Circumstances

New constraint statement. A significant unique circumstance is the large concentration (50 percent of assets) in Spencer Design stock. Diversifying the portfolio, in a tax-efficient manner, should be considered. Another factor is her desire to both build a new home in five years and to remain debt-free. Also, she would like to give each child one million dollars, but this is not a realistic goal and should not drive portfolio decisions.

Weakness of old constraint statement. The current policy fails to address the concentration in Spencer Design stock.

c. Portfolio B is most appropriate for the balance of Pierce's assets. Pierce has a $2,200,000 portfolio, including the Spencer Design company stock. The three portfolios in the Table 26I do not include

the Spencer Design stock, but this holding must be considered in determining which portfolio is appropriate for Pierce. The first consideration should be return. All three portfolios appear to exceed Pierce's apparent 7 percent before-tax return requirement. Including the Spencer stock, the expected return for Portfolio A is 8.8 percent, for B, 8.2 percent, and for C, 7.6 percent.

		Portfolio A		Portfolio B		Portfolio C	
Asset	Expected Returns	Weights	Weighted Returns	Weights	Weighted Returns	Weights	Weighted Returns
Money Market	4.2%	0.023	0.097%	0.023	0.097%	0.250	1.050%
Bonds	6.4%	0.223	1.427%	0.360	2.304%	0.150	0.960%
Equities	10.8%	0.254	2.743%	0.117	1.264%	0.100	1.080%
Spencer Stock	9.0%	0.500	4.500%	0.500	4.500%	0.500	4.500%
Total			8.767%		8.165%		7.600%

Therefore, the appropriate portfolio is more directly determined by risk and liquidity issues.

Portfolio A initially appears to be a reasonable asset mix. Cash is 4.6 percent of the portfolio, bonds 44.6 percent, and equities 50.7 percent. However, when the Spencer Design stock is included in the portfolio, the mix changes to 2.3 percent cash, 22.3 percent bonds, and 75.4 percent equities. Given her low short-term liquidity needs, the cash reserve level is appropriate. However, given her overall risk tolerance (especially her low willingness to assume risk), investing 75 percent of her assets in equities is too aggressive, even though she has a long time horizon. In addition, this portfolio leaves her inadequately diversified with respect to other asset classes.

Portfolio C, with 50 percent cash, 30 percent bonds, and only 20 percent equities, is overly conservative. When the Spencer stock is added to the portfolio, the mix appears more reasonable, with 15 percent bonds and 60 percent equities, but the remaining 25 percent cash is still excessive. Even considering her plan to build her dream house in five years (not a short-term liquidity need), it is inappropriate to hold this level of reserves and to forego the additional return potential in the meantime.

Portfolio B initially appears to be very conservative, with 4.6 percent cash, 72.0 percent bonds, and only 23.4 percent equities. However, when the Spencer stock is incorporated in the portfolio, the asset mix is 2.3 percent cash, 36.0 percent bonds, and 61.7 percent equities. The level of cash reserves is appropriate for the minimal near-term liquidity needs (her daughter's upcoming final year of college, present value of $18,000). Given that Portfolio B earns more than a sufficient expected return, the cash reserve level in Portfolio B is more appropriate than in Portfolio C, and the equity exposure and diversification in Portfolio B are more appropriate than in Portfolio A; this conclusion is further supported by Pierce's overall risk tolerance

(ability and willingness taken together). All of these factors together strongly suggest that Portfolio B is the most appropriate choice.

d. Because of Pierce's tax circumstances and the fact that each of the managers is expected to have very similar average market returns, standard deviation characteristics, and fees, the primary differentiating factor for Pierce should be the tax implications of the portfolio turnover that results from each manager's investment approach. On that basis, Manager H is most appropriate for Pierce.

Manager H would likely experience the lowest turnover. H is an active manager whose average holding period of seven years equates to an annual turnover of only 14.3 percent. With low annual turnover, capital gains are deferred and most often are long-term in nature and therefore taxed at a lower rate than would be the case for short-term gains. Also, as an active manager, the portfolio manager can focus on after-tax return strategies, including selling stocks at a loss to offset gains, reducing Pierce's tax obligation further.

Manager F holds a portfolio of stocks that is equally weighted. Therefore, at the end of each quarter, the manager will reduce the positions of stocks that outperformed the overall portfolio and purchase those that underperformed. These sales and purchases will likely result in numerous rebalancing transactions each quarter.

Although G manages a market-weighted value index portfolio, which would seemingly imply low turnover, G tracks the half of the index with the lowest price-to-book ratios. As relative price-to-book ratios change, the index will be rebalanced quarterly. In so doing, G's strategy may cause significant turnover in order to accommodate the addition and deletion of stocks in the value portion of the index.

Both Managers F and G will incur significant quarterly rebalancing costs. Also, as F and G sell the outperforming stocks in order to rebalance portfolios, they will tend to realize gains. It is likely that these gains will often be taxed at the higher short-term capital gain rates rather than the lower long-term capital gain rates. In addition, neither manager will be able to pursue any after-tax return maximization strategy, such as loss harvesting to offset gains, because this would increase tracking error relative to the respective indexes.

10. a.   Return Requirement: Pierce's return must be higher in order to:
- fund her additional living expenses, and;
- meet her new retirement goals.

Risk Tolerance: Pierce's risk tolerance is higher because:
- the longer time horizon leads to the ability to assume more risk, and;
- the increase in assets leads to the ability to assume more risk.

Liquidity: Pierce has a higher liquidity requirement because of:
- the cost of the surgery for her son, and;
- the down payment for the house.

Time Horizon: Pierce's time horizon has lengthened because of:
- her husband's extended retirement date, and;
- the uncertainty of continued care for her son when she and her husband are incapable.

b.   i. Spencer Design Stock: Decrease. Having a large percentage of her portfolio in one risky and potentially illiquid equity security exposes the portfolio to unnecessary and significant security specific risk.

ii. Money Market: Increase. Pierce needs $300,000 for a house down payment, $150,000 for her son's surgery, and the current year's portion of the $1,200,000 present value of ongoing living expenses

iii. Diversified Bond Fund: Increase. The Pierces' portfolio must support the $1,200,000 present value of ongoing living expenses and can sustain only moderate portfolio volatility. The regular income stream and diversification benefits offered by bonds are consistent with those needs.

iv. Large Capitalization Equities: Increase. Pierce requires growth and inflation protection in order to meet her current and future spending needs. A diversified equity portfolio is likely to meet those requirements over time while not imparting unacceptable volatility to principal values.

v. Emerging Market Equities: Decrease. Pierce requires high returns but cannot afford to sustain large losses. Having a large percentage of total assets in volatile emerging markets securities is too risky for Pierce

vi. Undeveloped commercial Land: Decrease. Pierce needs income and liquidity to meet ongoing portfolio disbursement requirements. Undeveloped land requires cash payments (taxes, etc.) and is often illiquid.

11.   a.   George More's expected accumulation at age 65:

	n	i	PV	PMT		FV
Fixed income	25	3%	$100,000	$1,500	⇒	FV = $264,067
Common stocks	25	6%	$100,000	$1,500	⇒	FV = $511,484

   b.   Expected retirement annuity:

	n	i	PV	FV		PMT
Fixed income	15	3%	$264,067	0	⇒	PMT = $22,120
Common stocks	15	6%	$511,484	0	⇒	PMT = $52,664

   c.   In order to get a fixed-income annuity of $30,000 per year, his accumulation at age 65 would have to be:

	n	i	PMT	FV		PV
Fixed income	15	3%	$30,000	0	⇒	PV = $358,138

His annual contribution would have to be:

	n	i	PV	FV		PMT
Fixed income	25	3%	$100,000	-$358,138	⇒	PMT = $4,080

This is an increase of $2,580 per year over his current contribution of $1,500 per year.

12.   a.   The least risky asset for a person investing for her child's college tuition is an account denominated in units of college tuition. Such an account is the College Sure CD offered by the College Savings Bank of Princeton, New Jersey. A unit of this CD pays, at maturity, an amount guaranteed to equal or exceed the average cost of a year of undergraduate tuition, as measured by an index prepared by the College Board.

   b.   The least risky asset for a defined benefit pension fund with benefit obligations that have an average duration of ten years is a bond portfolio with a duration of ten years and a present value equal to the present value of the pension obligation. This is an immunization strategy that provides a future value equal to (or greater than) the pension obligation, regardless of the direction of change in interest rates. Note that, as discussed in Chapter 16, immunization requires periodic rebalancing of the bond portfolio.

   c.   The least risky asset for a defined benefit pension fund that pays inflation-protected benefits is a portfolio of immunized Treasury Inflation-Indexed Securities with a duration equal to the duration of the pension obligation (i.e., in this scenario, a duration of ten years). (Note: These securities are also referred to as Treasury Inflation-Protected Securities, or TIPS.)

13. a. The answer to this question depends on the assumptions made about the investor's effective income tax rates for the period of accumulation and for the period of withdrawals. First, we assume that (i) tax rates remain constant throughout the entire time horizon; and, (ii) the investor's taxable income remains relatively constant throughout. Consequently, the investor's effective tax rate does not change, and we find that the Roth IRA and the conventional IRA provide the same after-tax benefits.

Alternatively, we might consider a scenario in which a household has a low income early in the accumulation period and higher income later in the accumulation period and during the withdrawal period. If tax rates are constant throughout the time horizon, then the investor's effective tax rate would be lower throughout the accumulation period than during the withdrawal period, and, as a result, the Roth IRA would provide higher after-tax benefits. This is a consequence of the fact that an investor's Roth IRA contributions during the accumulation period are taxed at the lower rate, while withdrawals from a conventional IRA would be taxed at the higher rate. Similarly, the conventional IRA provides higher after-tax benefits in the event that the effective tax rate is higher during the accumulation period than it is during the period of withdrawals.

Clearly, each of the scenarios described here represents an extremely unrealistic simplification. The issue becomes more complex if we consider the many possible changes, both in tax law and in the investor's individual circumstances, that can have an impact on the effective tax rate.

b. For the Roth IRA, contributions are made with after-tax dollars, so the tax rate is known (and taxes are paid) during the accumulation period; the tax rate for withdrawals at retirement from a Roth IRA is zero, and is therefore also known with certainty. On the other hand, contributions to a conventional IRA during the accumulation period are tax-free, but the tax rate for withdrawals is not known until the withdrawals are made at retirement. This tax rate uncertainty for a conventional IRA has two sources. First, the investor is unable to anticipate legislated changes in future tax rates; and, second, even if tax rates were to remain constant, the investor cannot determine her future tax bracket because she cannot accurately forecast her taxable income at retirement. Consequently, the Roth IRA provides protection against tax-rate uncertainty, while the conventional IRA subjects the investor to substantial tax rate uncertainty.