

**Achievement of Market-Friendly Initiatives and Results Program
(AMIR 2.0 Program)**

Funded by U.S. Agency for International Development

Portfolio Management Practice Exam 1 and Solutions

By
Ronald E. Copley
President
Copley Investment Management

Contract No. 278-C-00-02-00210-00

2003

Practice Exam - 1:

ELM CITY COMMUNITY FOUNDATION

The Elm City Community Foundation (the Foundation) was established as a nonprofit corporation in 1988. Bylaws of the Foundation specify that it will receive gifts, grants, and bequests from individuals and corporations for the purpose of making donations to approved tax exempt organizations under Section 501 (c)(3) of the Internal Revenue Code of 1954. Charitable, scientific, cultural, religious, civic, and educational organizations attuned to the needs of the community receive funding from the Foundation.

In carrying out this purpose, the Foundation accepts unrestricted contributions, restricted contributions, and endowments. Unrestricted contributions allow the Foundation to direct such contributions in accordance with Foundation bylaws without restriction. Restricted contributions allow the maker to direct income and/or principal to such beneficiary as the maker may designate within constraints outlined in the bylaws of the Foundation. Endowments require that the Foundation invest the principal of the contribution in perpetuity and that only the income of the contribution be available for expenditure. In some instances, the endowment instrument may require that the Foundation add income to the principal for a specified period of time.

After several years of fund-raising efforts by the Foundation's Executive Director, Mr. Joseph E. Small, the 1995 year-end Foundation Balance Sheet shows the following (net of expenses):

Unrestricted Contributions	\$18,432
Restricted Contributions	38,212
Endowment Contributions	<u>46,508</u>
Total Contributions	\$103,152

Notes to the Balance Sheet show \$53,152 invested in a money market mutual fund and the remaining \$50,000 invested in a bank certificate of deposit maturing June 1, 1996.

A. It is now April 15, 1996 and Mr. Small has hired you as a consultant. **Prepare** an appropriate Investment Policy Statement and justify an asset allocation for the Foundation.

B. You have just returned from a meeting with Mr. Small where you expressed your concern about the impact of inflation on the value of the portfolio. You explain to Mr. Small that, over time, inflation can erode the purchasing power of the endowment portfolio. You suggest that the Foundation adopt a "spending policy" for the endowment whereby all the income generated in any particular year is not spent, but some of it is reinvested back into to portfolio in order to maintain the endowment's constant purchasing value. Mr. Small thinks this is a good idea and asks you to construct such a spending policy. **Prepare** and **demonstrate** a "spending policy" for the endowment.

C. It is now May 1996 and the endowment component has grown to over \$50 million dollars both as a result of additional contributions and investment returns. In your most recent meeting with Mr. Small, you outline to him your estimates of future returns by asset class as follows:

Long Term Forecast of Asset Class Returns and Risk

Asset Class	Average Return	Risk (Std. Dev.)
Large-Cap Stocks	10.0%	18.0%
Intl. Large-Cap Stocks	12.0%	20.0%
U.S. Small-Cap Stocks	15.0%	30.0%
LT Corp. Bonds	6.0%	9.3%
LT Govt. Bonds	5.5%	9.0%
T-Bills	3.0%	3.0%
Inflation	2.0%	4.0%

You also explain to Mr. Small the advantages of diversifying across multiple asset classes as a methodology for smoothing portfolio returns. Mr. Small likes this idea and asks you to **prepare** a policy statement incorporating all the asset classes for which you have made future estimates of returns. He tells you that because the Foundation is now well established in the community, liquidity needs are relatively low. He also states that the Foundation's risk tolerances have not changed over the years.

D. Given long term forecast of asset class returns and risk in the table above, Mr. Small states that it appears to him that the Foundation should invest all of its money in U.S. small-cap stocks since you expect this investment to present the greatest expected return. **Graphically explain** to Mr. Small why such an action would not be a good idea.

E. **Comment** on what other information you need in addition to that presented in the table above to construct an efficient frontier, and **discuss** the difference between the Markowitz efficient frontier and the Sharpe frontier.

F. **Explain** the importance of the efficient market assumption to the construction of an efficient frontier.

G. One of the committee members states that she believes the Foundation should invest in individual securities opposed to mutual funds. Another member argues in favor of mutual funds. **Explain** the advantages and disadvantages of each investment vehicle.

H. **Comment** on the importance of selecting an appropriate benchmark portfolio for evaluating portfolio performance and **explain** how you would construct such a benchmark.

I. **Discuss** how portfolio ex-post returns should be calculated for a performance evaluation.

J. The performance techniques of Treynor, Sharpe, and Jensen assume that the risk of the portfolio remains constant over the evaluation period. **Discuss** the implications of this assumption for the performance of the Foundation's portfolio.

K. **Compare** and **contrast** the "size" and "January" effects. Explain whether studies of these possible anomalies indicate that risk-adjusted excess return are available to the foundation?

L. **Justify** whether you think a passive or an active investment strategy is appropriate for the foundation.

- M. “The benefits of including real estate in a portfolio are based on studies of historical (ex-post) relationships.” **Explain** this statement and its implications for construction of the Foundation’s portfolio.
- N. The Foundation has switched its policy away from mutual funds to investing in 20 carefully selected individual stocks and is now in the process of evaluating the portfolio’s performance over the past year. In reviewing the data, you observe that the portfolio had a return of 23 percent, a beta of 1.0, and a standard deviation of 13 percent. You also observed that the market portfolio (S&P 500) had a return of 14 percent and a standard deviation of 13 percent. **Explain** these results to the committee in terms of risk.
- O. The Foundation has decided to invest a portion of future funds into international securities, but is unsure about how to evaluate the results. In the discussion that follows, one trustee suggests using the following conventional attribution approach:

Market Selection	Currency Selection	Security Selection
Local Market Return - Index of Local Currency Return	Exchange Rate Return - Exchange Rate Return Index	Actual Local Market Return - Passive Local Market Return

- Explain** to the Board the problem with using this approach and **suggest** a superior approach.
- P. A new member of the Board is somewhat unfamiliar with setting investment objectives and asks you how this is done. **Explain** to the new member a systematic approach for determining proper investment objectives.

Solution for Practice Exam - 1:

A.

**INVESTMENT POLICY STATEMENT
ELM CITY COMMUNITY FOUNDATION
(April 15, 1996)**

The Elm City Community Foundation (the Foundation), established as a nonprofit corporation in 1988, receives gifts, grants, and bequests from individuals and corporations for the purpose of making donations to approved tax exempt organizations attuned to the needs of the community.

In carrying out this purpose, the Foundation accepts unrestricted contributions, restricted contributions, and endowments. Unrestricted contributions allow the Foundation discretion to direct such contributions in accordance with Foundation bylaws. Restricted contributions permit the donor to direct income and/or principal to such beneficiary as the donor may designate in accordance with Foundation bylaws. Endowments require the Foundation to invest the principal in perpetuity, but permit the Foundation to expend income in accordance with Foundation bylaws. In some instances, the endowment instrument may require that the Foundation add income to the principal for a specified period of time.

The purpose of this policy statement is to establish investment strategies for each of the three types of contributions. Section I deals with the separate portfolio of restricted and unrestricted contributions collectively referred to as the non-endowment portfolio. Section II deals with the endowment portfolio. The Appendix establishes a spending rule for the Foundation to follow to insure that the endowment portfolio maintains its real value over time.

I. RESTRICTED AND UNRESTRICTED CONTRIBUTIONS (THE NON-ENDOWMENT PORTFOLIO):

OBJECTIVES:

Return Requirement: The Foundation expects to earn an average rate of return approximating that of U.S. Treasury bills.
Risk Tolerance: Very low.

CONSTRAINTS:

Liquidity: Liquidity is highly important since these funds must be available for possible distribution on short notice.
Time Horizon: Short-term.
Regulatory and Legal: The Foundation must adhere to state law concerning the standard prudent man rule.
Tax Considerations: Because the Foundation is tax exempt, tax considerations do not affect investment policy.
Unique Needs: Given that the Foundation wishes to enlist community support, use of local financial institutions is desirable whenever possible.

POLICY:

Asset Allocation:

Asset Class

% of Portfolio

Common Stock	0% - 10%
Bonds	0% - 20%
Money Market Instruments	80% - 100%

Most of the funds will be invested in money market instruments in the form of either individual money market securities or money market mutual funds. For a discussion of these investments as well as investing in the stock and bond markets, see COMMENTS, Section II, below.

II. ENDOWMENT PORTFOLIO:

OBJECTIVES:

Return Requirement: The Foundation expects to earn the highest return possible consistent with preservation of capital and generation of current income. Maintaining the real value of the portfolio over the long run as well as generating some level of annual income are important investment factors. Selected stocks, bonds, and money market instruments provide this potential.

Risk Tolerance: Until the Foundation becomes more fully funded, the risk tolerance of this portfolio is below average. Broad diversification across several asset classes is highly desirable.

CONSTRAINTS:

Liquidity: Because the Foundation is still in the early stages of formation, liquidity (meaning preservation of capital) is a major concern at this time.

Time Horizon: Below average risk tolerance requires that the portfolio be invested over the short-term to intermediate-term time horizon. As the portfolio grows, the Foundation may wish to extend this time horizon.

Regulatory and Legal: The Foundation must adhere to state law concerning the standard prudent man rule.

Tax Considerations: Because the Foundation is tax exempt, tax considerations do not affect investment policy.

Unique Needs: Given that the Foundation wishes to enlist community support, use of local financial institutions is desirable whenever possible. If the endowment instrument requires that the Foundation add income to the principal for a specified period of time, such income shall be held in money market instruments that meet the criteria set forth below.

POLICY:

Asset Allocation:	
<u>Asset Class</u>	<u>% of Portfolio</u>
Common Stocks	40% - 50%
Bonds:	
Short-term	20% - 25%
Intermediate-term	20% - 25%
Money Market Instruments	0% - 15%

COMMENTS: During the early stages of development, the Foundation shall rely primarily on mutual funds to maintain broad diversification with relatively small amounts of money and for ease of administration. As the portfolio grows, the Foundation may be able to handle more administrative responsibilities and wish to consider creating its own diversification through the purchase of individual securities.

Equity mutual funds shall have an investment objective of providing a high level of current income by investing principally in dividend-paying stocks with the potential for capital appreciation and securities which are convertible into common stocks. Equity mutual funds seeking growth and income with emphasis on large-capitalization companies are also acceptable. Bond mutual funds shall invest in bonds with short-term maturities (1 to 3 years) and intermediate-term maturities (3 to 10 years) of high grade corporate issues (no less than AA) and issues of the U.S. government or its agencies. Money market mutual funds shall be confined to funds that invest mostly in U.S. Treasury bills and high-grade commercial paper.

NOTE: The Foundation shall review the investment policies outlined in this statement at least annually to insure that these policies are in accordance with Foundation expectations, or whenever a significant change in the Foundation occurs. For example, at some future time as the portfolio grows the Foundation may wish to include additional asset classes in the portfolio.

B. Spending Policy for the Endowment

Over time, the real value of the portfolio (adjusted for inflation) is more important than maintaining the nominal value (unadjusted for inflation). Maintenance of the endowment portfolio's real value requires that the rate of reinvestment equal the rate of inflation during any particular year. The purpose of this policy is to establish a spending rule that preserves the real purchasing value of the portfolio for future generations.

1st Rule

Generally speaking, this rule would earmark returns generated from the non-equity component for current spending and returns generated from the equity component for reinvestment. According to this rule, maintaining the endowment portfolio's real value requires that the rate of reinvestment equal the rate of inflation during the year. According to the policy statement, the stock component of the endowment portfolio should average around 40 percent each year. Assuming that equities provide a 15% annual rate of return and that the rate of inflation averages 6% per year, the stock component would provide the 6% increase in portfolio value ($15\% \times .4 = 6\%$) necessary to offset the detrimental effects of inflation. Given this scenario, income from the bond and money market components would be available for annual expenditure.

The advantage of this rule is its simplicity. The disadvantage is that it is heavily dependent on a set of assumptions that may not hold true in the future. If, for example, inflation were to increase to 8% and the stock market were to provide a 10% rate of return in any particular year, the real value of the portfolio would decline in that year by 4%. Over several years, the real value of the portfolio would decline significantly.

Alternative Rule

An alternative spending rule is:

1. Calculate the endowment portfolio's Total Return for the prior 12 months according to the formula:
Total Return = (End Port. Val. - Begin Port. Val. + Income) divided by End Port. Value;
2. Observe the rate of inflation for the same time period;
3. Subtract the inflation rate from the Total Return.

The part of the Total Return remaining after subtracting out the rate of inflation represents the percentage of funds the Foundation could spend at the end of the year while maintaining the portfolio's real value. If, for example, the Total Return equaled 10% and the inflation rate equaled 8%, the Foundation could spend 2% of the funds in the portfolio at the end of the year.

The advantage of this alternative spending rule is that it is not dependent on a restrictive set of assumptions that may not hold true in the future. The disadvantage is that the amount of income available for spending would be unknown and volatile from year to year. On balance, however, the alternative rule is superior to the first rule. Still, the important point is that the Foundation adopt a rule and not simply ignore the issue.

C.

**INVESTMENT POLICY STATEMENT
ELM CITY COMMUNITY FOUNDATION
(April 15, 1996)**

I. RESTRICTED AND UNRESTRICTED CONTRIBUTIONS (THE NON-ENDOWMENT PORTFOLIO):

Same as before.

II. ENDOWMENT PORTFOLIO:

OBJECTIVES:

Return Requirement: The Foundation's first priority is conservative growth.

Income generation and preservation of capital are secondary objectives.

Risk Tolerance: Risk tolerance of the endowment is average to slightly below average. Broad diversification across multiple asset classes is highly desirable.

CONSTRAINTS:

Liquidity: Because the Foundation is now well established in the community and has no pressing demands for immediate funding, liquidity needs are not important. Still, the portfolio should maintain modest liquidity for both investment purposes and unknown demands that could occur in the near future.

Time Horizon: Long term. The Foundation is beyond its initial stage of development and can now take a long-term view for investment purposes in pursuit of higher rates of return.

Regulatory and Legal: The Foundation must adhere to state law concerning the standard prudent man rule.

Tax Considerations: Because the Foundation is tax exempt, tax considerations do not affect investment policy.

Unique Needs: The Foundation still wishes to use of local financial institutions whenever possible.

POLICY:

Asset Allocation:

<u>Asset Class</u>	<u>% of Portfolio</u>
Common Stocks	
Large-Cap Domestic	20% - 35%
International Large-Cap	10% - 20%

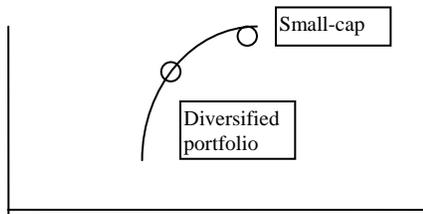
U.S. Small-Cap	10% - 20%
Bonds:	
LT Corporates	10% - 20%
LT Governments	10% - 20%
Money Market Instruments	0% - 5%

COMMENTS: Because the portfolio is now fairly large, the Foundation wishes to avoid mutual funds by investing directly into individual securities. The large-cap equity component of the portfolio shall consist of approximately 15 - 20 stocks diversified across industry sectors with a history of at least 5 years of positive earnings and dividends. The small-cap equity component shall consist of approximately 30 stocks trading Over The Counter. The distinction between large-cap and small-cap shall be \$500 million total market capitalization. International large-cap stocks shall be restricted to American Depository Receipts.

The bond component shall be diversified across time by staggering durations from one through 7 years. Bond selections shall be confined to high grade corporate issues (no less than AA) and issues of the U.S. government or its agencies. Money market instruments shall be confined to U.S. government issues or its agencies, high grade commercial paper and issues of insured (FDIC) financial institutions with deposits of any single account not exceeding \$100,000.

NOTE: The Foundation shall review the investment policies outlined in this statement at least annually to insure that these policies are in accordance with Foundation expectations, or whenever a significant change in the Foundation occurs.

D.



Because small cap stocks, as an asset class, fall on the right hand side of the efficient frontier, they represent the highest expected return and the greatest risk. Investing all of the Foundation's money in small caps would mean taking more risk than the Foundation wishes to take. Over the long-run, such a strategy should generate the highest return, but not necessarily. Moreover, the small cap stock asset class may not lie on the efficient frontier meaning that the Foundation would be incurring unsystematic risk. Investing in a diversified portfolio that lies toward the center of the efficient frontier would eliminate unsystematic risk. Finally, a strategy based on diversification is much easier to defend to prospective donors than a high risk investment strategy. The law demands prudence, which implies diversification, when investing other people's money.

E. In addition to expected returns and expected risk, you would need covariances or correlation coefficients to construct an efficient frontier. The portfolio standard deviation equals the product of the standard deviations of each asset class weighted according to the proportion invested in each asset class plus the product of pairwise covariances times the weight invested in each asset class times the standard deviation of each asset class.

The Markowitz efficient frontier is a curve while the Sharpe efficient frontier is a straight line. The Sharpe frontier is based on the combination of the risk-free asset and the market portfolio, which is the composite of all risky assets in the universe.

- F. The assumption of an efficient market is important because the risk of the portfolio depends on the elimination of unsystematic risk. This is the basis for diversification. If the market were not efficient, the measure of portfolio risk would have to include an estimate of unsystematic risk. To assume that the market is inefficient is irrational since it would imply that over long periods of time investors could attain a rate of return greater than the average without assuming any more risk than that associated with the average return.
- G. Advantages of a mutual fund include instant diversification, exposure to a wide selection of investment styles some of which you may not profess (i.e., international), expert trading, collection and automatic reinvestment of dividends and capital gains, and prepared account statements. Disadvantages of mutual funds include an additional management fee, relinquishment of a certain degree of investment decision to someone else, and a certain degree of compromise on risk tolerances. In general, investing in individual securities would allow the Foundation greater investment flexibility in designing a portfolio with specific risk tolerances and return expectations. At the same time, individual securities would require greater effort for the Foundation's staff. For a small foundation, this could be quite a burden.
- H. Selection of an appropriate benchmark is vital to all investment programs. It is especially important to select a benchmark prior to implementing the program because it allows both the client and portfolio manager to focus on a common goal. To try and measure performance without first selecting a benchmark is irrational since both the client and manager need some standard for measuring performance.
- I. Holding period returns (HPR) are calculated like HPRs on individual securities. The HPR should include income distributions and changes in the value of the portfolio over the holding period. An HPR can be calculated for a holding period of any length. For holding periods longer than one year, however, the effects of compounding, including reinvestment of income distributions, should be recognized.
- J. All three performance techniques use a single ex-post risk measure calculated for the period of the evaluation. This assumes that risk was constant over the evaluation period. Numerous studies have shown that risk measures for randomly formed portfolios are not stable over time. Active portfolio management using selection and timing strategies is likely to result in changes in the risk of the portfolio over time. Assuming constant risk for actively managed portfolio is probably not a valid assumption. For passively managed portfolios, risk may be more stable over time.
- K. The size effect deals with the possible relationship between the total market value of a company and the HPRs on the company's common stock. The January effect deals with the possibility that HPRs on common stocks are consistently higher in January than in other months. These effects are possible market inefficiencies that could offer investors risk adjusted excess returns. There is debate, however, about the empirical tests that have been performed to analyze these effects. Questions have been raised about the methodology (often CAPM-based) used to adjust for risk. Are these effects anomalies or do they exist because of

inappropriate or inaccurate empirical tests is a lingering issue.

- L. The Foundation’s decision to be an active or passive investor depends to a large extent on the degree of market efficiency. Generally, it is probably correct to conclude that simple or naïve active investment strategies cannot outperform the market. A successful active strategy must use techniques or procedures that can identify useful information that might not be incorporated into prices. This approach requires considerable time and effort on the part of the foundation. For this foundation, an active strategy is probably unwise since it is small and is still trying to win the confidence of the community.
- M. Historical studies have shown that including real estate in a portfolio of financial assets may improve the risk-adjusted performance of the portfolio. The difficulty with these studies is that there is no guarantee that the historical relationships that made real estate an effective diversifier in the past will be repeated in the future. For example, the risk and return characteristics of real estate investments in the early 1990s were considerably different than in the 1970s and 1980s.
- N. The portfolio outperformed the market for two possible reasons. First, the portfolio was undiversified since it contained only 20 stocks whereas the market portfolio contains 500 stocks. Second, we know that the portfolio’s superior performance was due to superior stock selection. The 20 stocks in the portfolio were some of the best performing stocks out of the 500 stocks in the index. The question is whether the superior results were driven by the lack of diversification, superior stock selection, or a combination of both (see Fama’s decomposition model discussed in Elton and Gruber, page 588).

In this case, you would explain that the portfolio’s superior results were driven by the manager’s stock selection ability and not a lack of diversification. You know this because the standard deviation of the portfolio is the same as the standard deviation of the index, meaning that the total risk of the portfolio is the same as the total risk of the index. Additionally, you know that the portfolio’s beta equals 1.0, meaning that the systematic risk of the portfolio equals the systematic risk of the index (see footnote, page 589, Elton and Gruber). Because both the total risk and the systematic risks are equal, you know that the portfolio contains no unsystematic risk (no diversifiable risk). Thus, the portfolio’s superior results were solely driven by the manager’s stock selection ability and not a lack of diversification.

- O. See Karnosky and Singer, “Global Asset Management and Performance Attribution”

	Market Selection	Currency Selection	Security Selection
Conventional Analysis (T10)	Local Market Return - Index of Local Market Return (T4)	Exchange Rate Return - Exchange Rate Return Index (T4)	Actual Local Market Return - Passive Local Market Return (T9)
Proposed Analysis (T11)	Passive Local Market <u>Return Premium</u> - Index of Local Market <u>Return Premium</u> (T9)	Eurodeposit Return - Index of Eurodeposit Return (T9)	Actual Local Market <u>Return Premium</u> - Passive Local Market <u>Return Premium</u> (T9)

You explain that the excess returns contain three components: (1) a market selection component, (2) a currency selection component, and (3) a security selection component. You further explain that you will evaluate the market selection and security selection components using return premiums and indexes of return premiums opposed to absolute local market returns and indexes of local market returns, and that you will evaluate the currency selection component using Eurodeposit returns and an index of Eurodeposit returns opposed to exchange rate returns and an index of exchange rate returns. The difference between the two approaches is that the conventional analysis incorrectly focuses on total returns and exchange rate returns whereas the proposed analysis correctly focuses on return premiums and Eurodeposit Returns. The conventional approach ignores the interest rate differentials among countries, whereas the proposed approach directly considers any interest rate differentials that may be responsible for a significant portion of the active performance.

- P. One systematic approach is to first, determine the Foundations liquidity needs involving unanticipated cash outlays within the next twelve months. Such a need may occur due to an unexpected repair caused by the most recent tropical storm at the Boy's Club basketball court. After setting aside a reasonable amount of money for liquidity invested in short-term T-bills, the second step would be to determine any ongoing income needs for such worthwhile community projects as helping the local girl's club fund a summer computer camp for young girls. After setting aside a reasonable amount of money for income invested in intermediate and long-term bonds, the third and final step is to invest any remaining funds for growth in domestic and international stock for the purpose of maintaining future purchasing power.