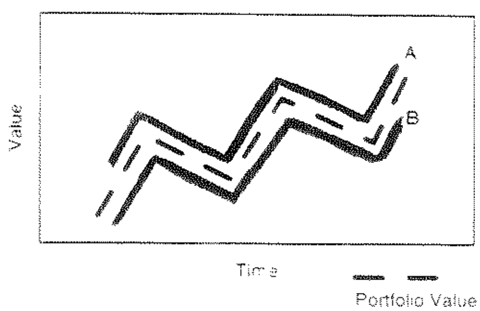
Correlation

Traditionally, investment analysis focused only on the risk/reward characteristics of individual securities or asset classes.

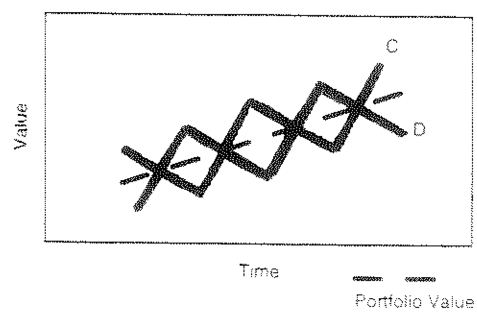
The process of **Asset Allocation** considers, additionally, the impact that the inclusion of a particular asset class will have on the overall portfolio.

Perfect Positive Correlation (+1.0)



- No diversification effect
- Portfolio risk is an average of A and B

Perfect Negative Correlation (-1.0)



- Maximum diversification effect
- Portfolio risk is eliminated

The ability of the pattern of returns in one asset class to partially offset the pattern in another is a crucial factor in reducing overall portfolio risk.

The charts above are presented for illustrative purposes only and are not intended to be representative of the performance of any specific investment

Portfolio Optimization

The optimal **Asset Allocation** for a particular portfolio is the unique combination of asset classes which either:

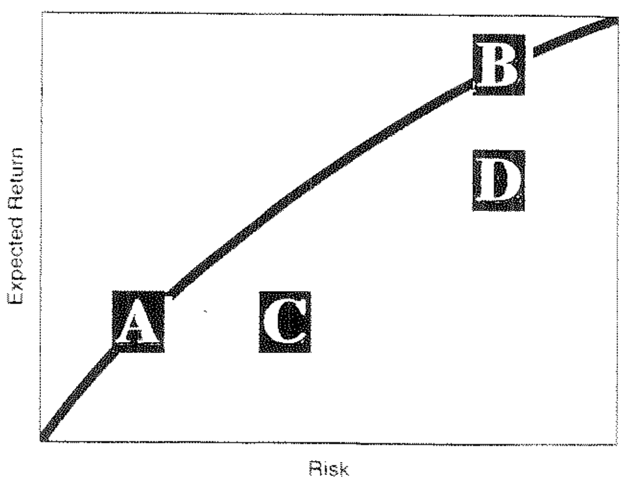
☑ **Minimizes risk for a given expected return**

or

☑ **Maximizes expected return for a given level of risk**

An investment portfolio that achieves either of these objectives is said to be efficient.

A graph which connects each of the optimal portfolios associated with each possible level of expected return forms what is known as the EFFICIENT FRONTIER.

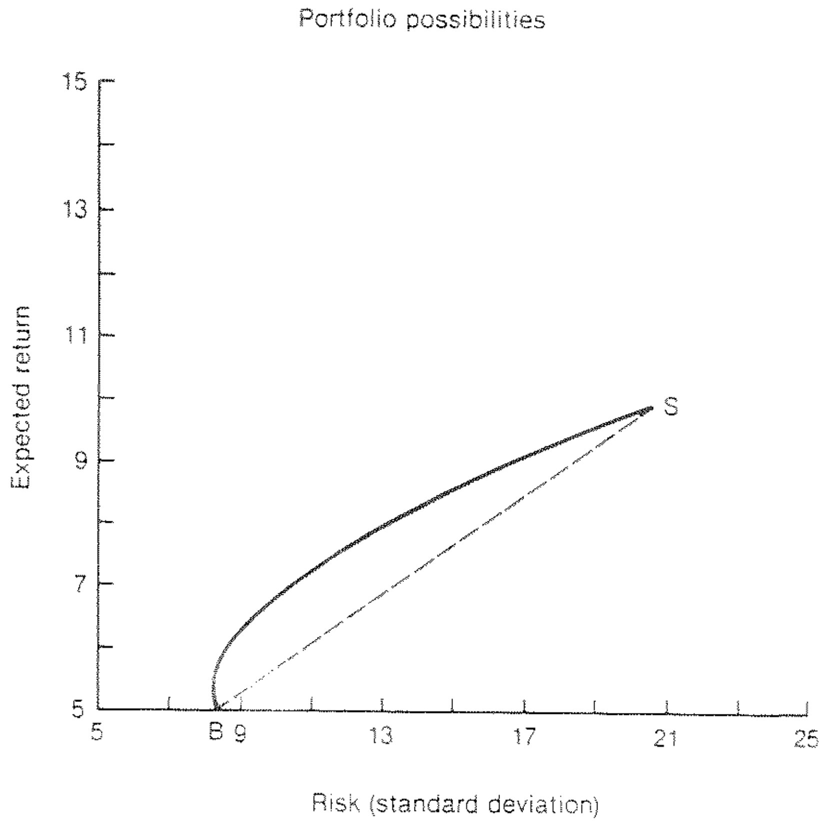


- **Portfolios A and B are efficient**
- **Portfolio C is inefficient** since it has the same expected return as portfolio A, but greater risk
- **Portfolio D is inefficient** since it has the same level of risk as portfolio B, but a lower expected return

Your objective should be to allocate assets in such a way that the resulting portfolio lies on the Efficient Frontier.

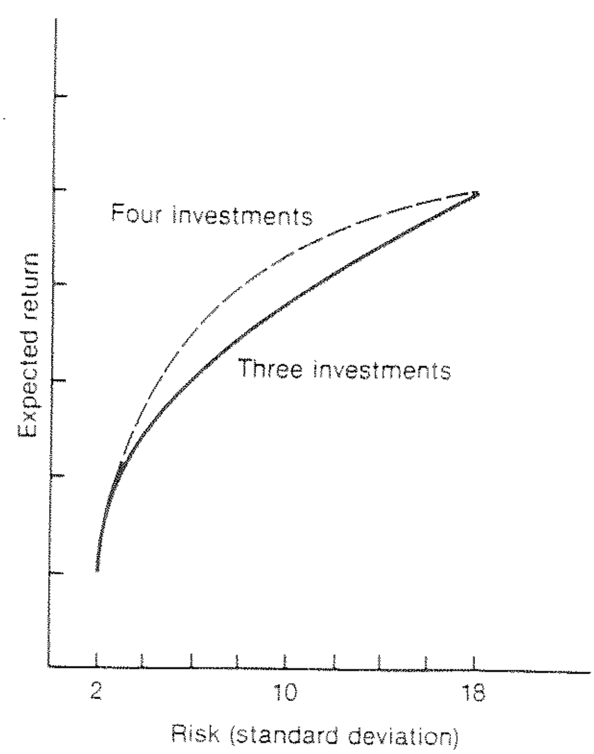
Portfolios that lie on the Efficient Frontier have less risk than any other portfolio with equivalent expected return, or alternatively, have greater expected return than any other portfolio with equivalent risk.

Corporate Bond/Common Stock

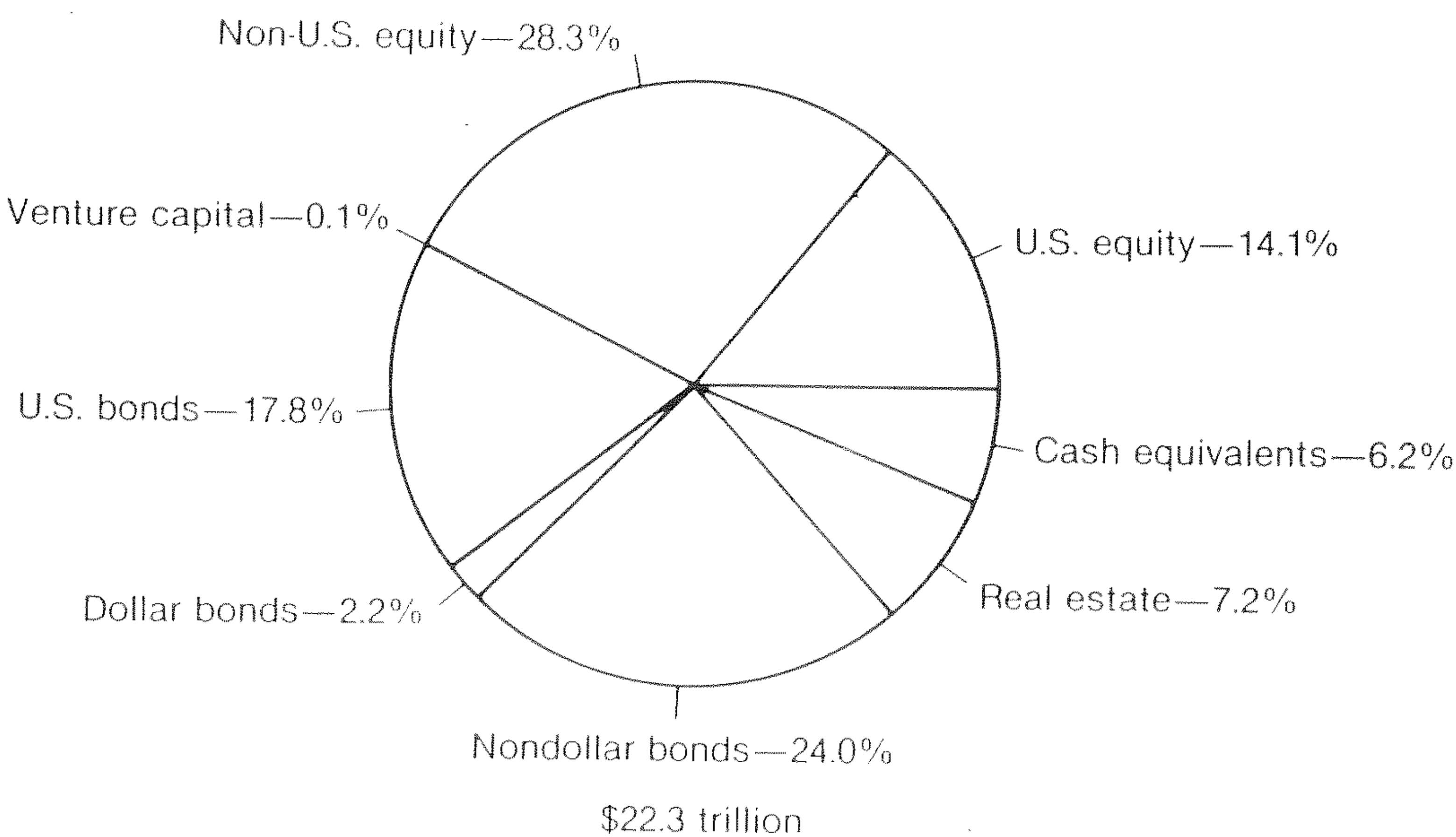


Source: Illustration produced using Vestek Systems, Inc. software.

Three versus Four Investment Alternative Efficient Frontiers

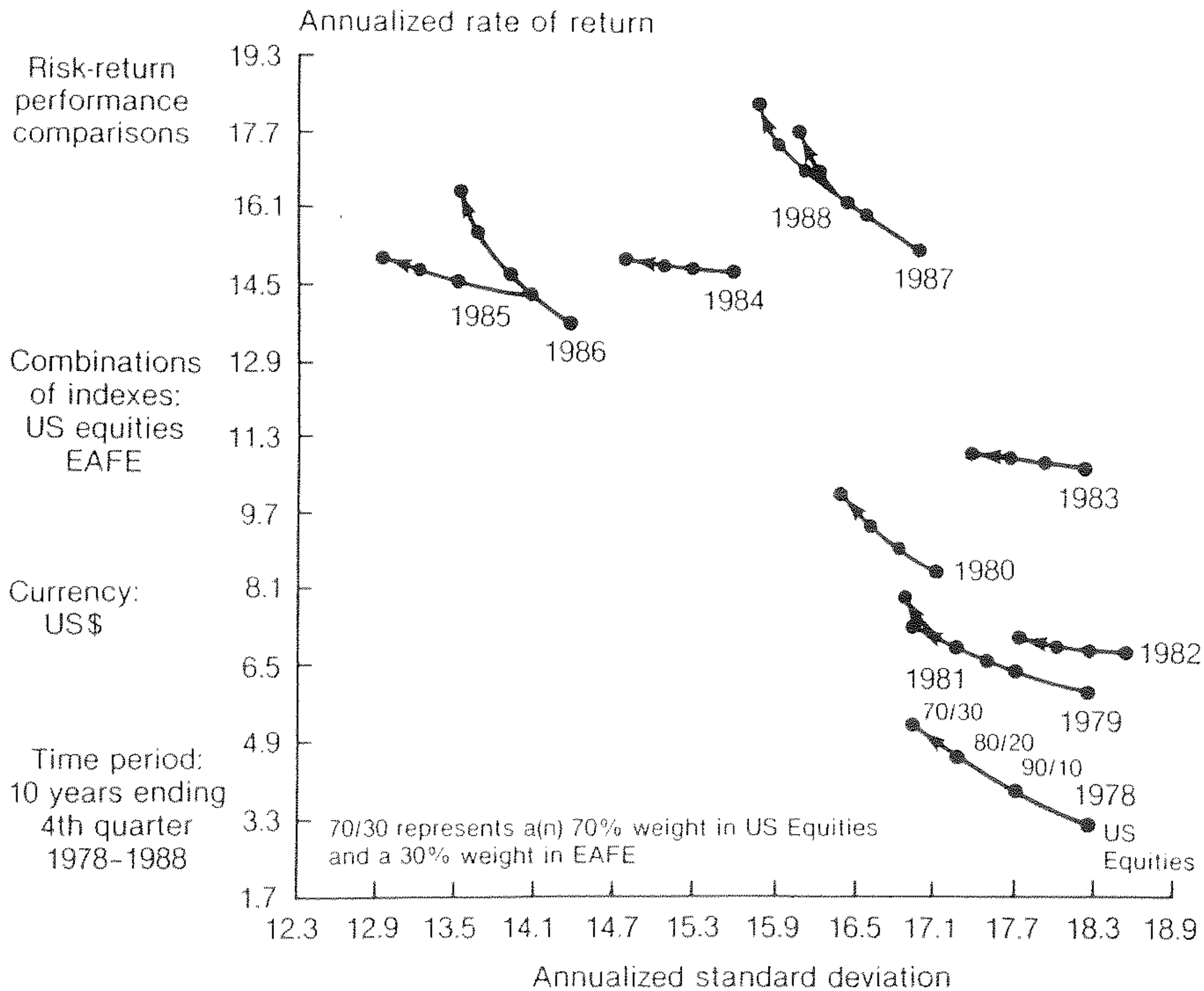


Total Investable Capital Market as of December 31, 1988 (Preliminary) Note: May not add to 100% due to rounding

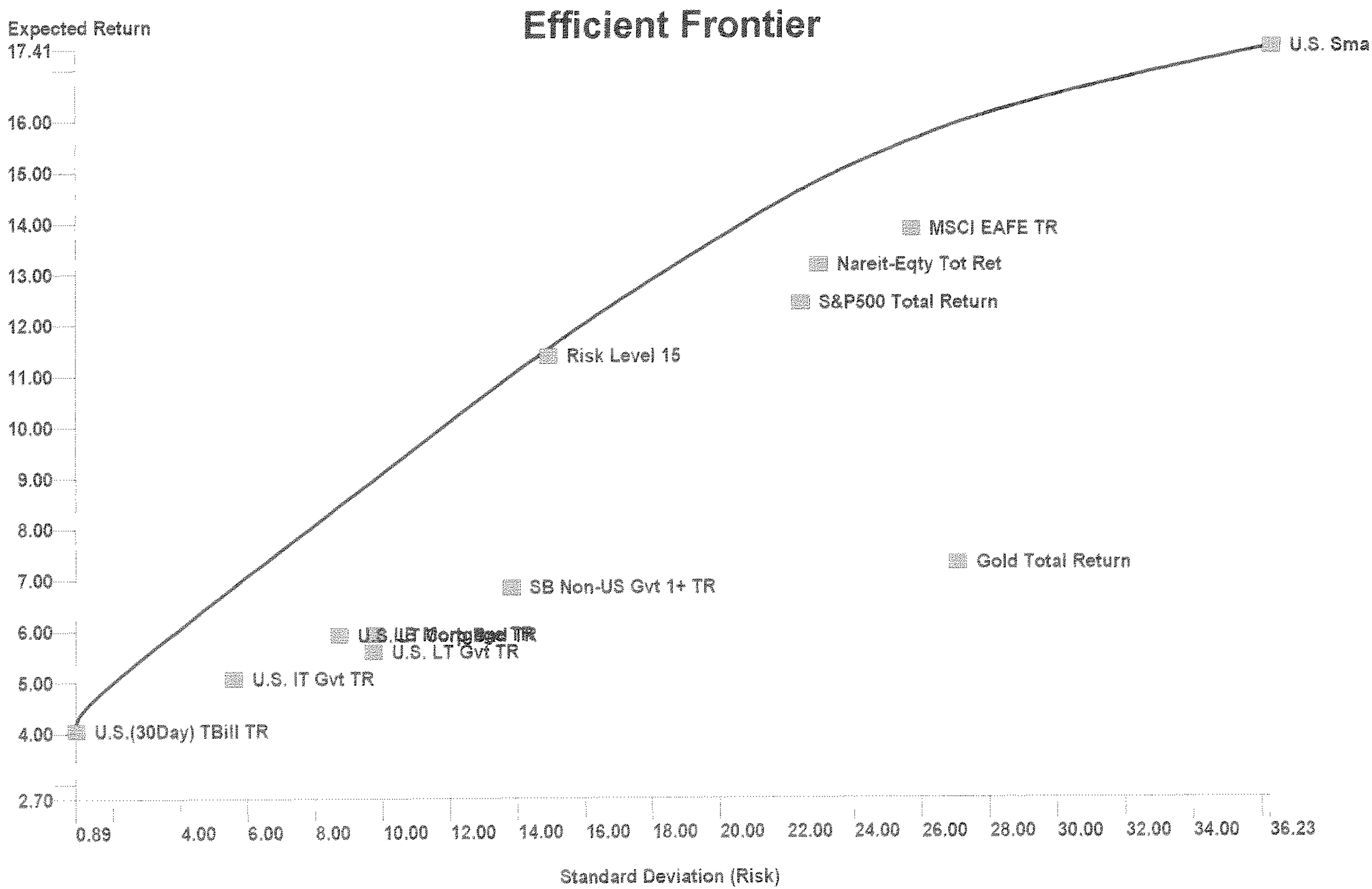


Source: First Chicago Investment Advisors.

Long-Term: Increased Return and Reduced Risk



Source: Russell Analytical Services.


Efficient Frontier
Expected Return
17.41
16.00
15.00
14.00
13.00
12.00
11.00
10.00
9.00
8.00
7.00
6.00
5.00
4.00
2.70
0.89
4.00
6.00
8.00
10.00
12.00
14.00
16.00
18.00
20.00
22.00
24.00
26.00
28.00
30.00
32.00
34.00
36.23
Standard Deviation (Risk)
U.S. Sma
MSCI EAFE TR
Nareit-Eqty Tot Ret
S&P500 Total Return
Risk Level 15
Gold Total Return
SB Non-US Gvt 1+ TR
U.S. LT Gvt TR
U.S. IT Gvt TR
U.S.(30Day) TBill TR