Financial Markets and Instruments (Lecture 6)

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- Class Stocktrack:

- ISEGULisboaFMI2015

- Como escolher o perfil de investimento?

- Como escolher o perfil de investimento?

- A análise neoclássica da teoria da utilidade

- Introdução às funções de preferencia.

Investment A		Investment B	
Outcome	Probability of Outcome	Outcome	Probability of Outcome
15	1/3	20	1/3
10	1/3	12	1/3
5	1/3	4	1/3

Table 10-1 Two Alternative Investments

	Islanders	Flyers
Wins	40	45
Ties	20	5
Losses	10	20

Table 10-2 Data for Ranking Hockey Teams

- Aplicando o cálculo à equipa dos Islanders:

- U= 40*2 + 20*1 + 10 * 0 = 100

- Para os Flyers:

- U = 45 * 2 + 5 *1 + 20 * 0 = 95

$$E(U) = \sum_{W=1}^{N} U(W) P(W)$$

Investment A		Investment B		Investment C	
Outcome	Probability	Outcome	Probability	Outcome	Probability
20	3/15	19	1/5	18	1/4
18	5/15	10	2/5	16	1/4
14	4/15	5	2/5	12	1/4
10	2/15			8	1/4
6	1/15				

Table 10-3 Outcomes and Associated Probabilities for Three Investments

- Supor a seguinte função de utilidade:

- $U(W) = 4W - (1/10)W^2$

Investment A			Investment B			Investment C		
Outcome	Utility of Outcome	Probability	Outcome	Utility of Outcome	Probability	Outcome	Utility of Outcome	Probability
20	40	3/15	19	39.9	1/5	18	39.6	1/4
18	39.6	5/15	10	30	2/5	16	38.4	1/4
14	36.4	4/15	5	17.5	2/5	12	33.6	1/4
10	30	2/15				8	25.6	1/4
6	20.4	1/15						

Table 10-4 Including Utility

Expected utility $A = (40)(3/15) + (39.6)(5/15) + (36.4)(4/15)$
$$+ (30)(2/15) + (20.4)(1/15)$$

$$= \frac{544}{15} = 36.3$$

Expected utility $B = (39.9)(1/5) + (30)(2/5) + (17.5)(2/5)$

$$= \frac{134.9}{5} = 26.98$$

Expected utility $C = (39.6)(1/4) + (38.4)(1/4) + (33.6)(1/4) + (25.6)(1/4)$

$$= \frac{137.2}{4} = 34.4$$

- Propriedades económicas das funções de utilidade

Pressupostos:

- 1- Comparabilidade.

- 2- Transitividade.

- 3- Independência.

- 4- Valores de equivalência exactos.

Invest			Do Not Invest	
Outcome	Probability		Outcome	Probability
2	1/2		1	1
0	1/2			

- Primeira derivada > 0

- Segunda derivada define o perfil de risco do investidor.

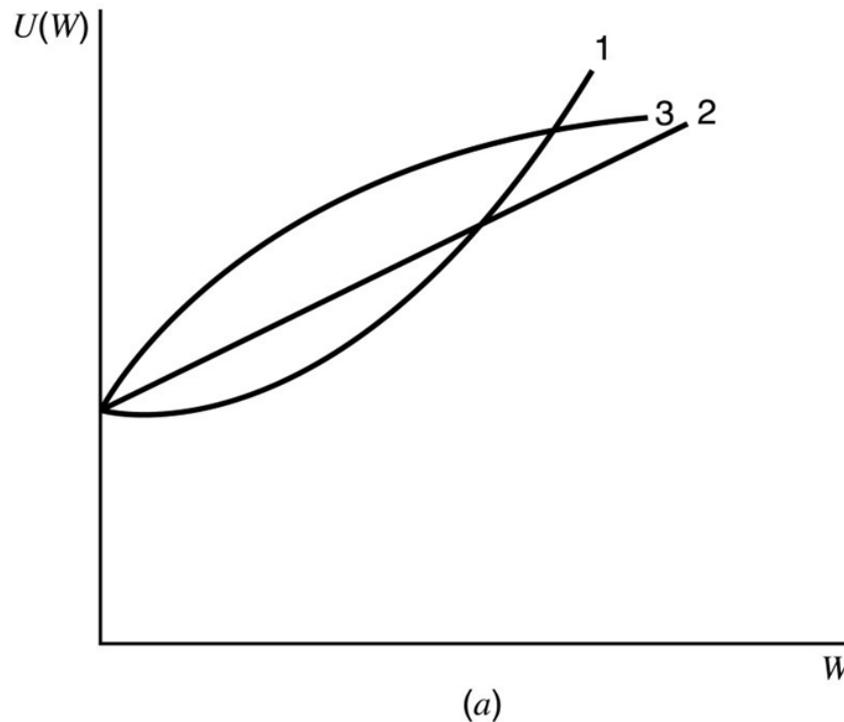| Condition	Definition	Implication
1. Risk aversion	Reject fair gamble	$U''(0) < 0$
2. Risk neutrality	Indifferent to fair gamble	$U''(0) = 0$
3. Risk preference	Select a fair gamble	$U''(0) > 0$

FIGURE 10-1 Characteristics of functions with different risk-aversion coefficients. (1) Utility function of a risk-seeking investor. (2) Utility function of a risk-neutral investor. (3) Utility function of a risk-averse investor.
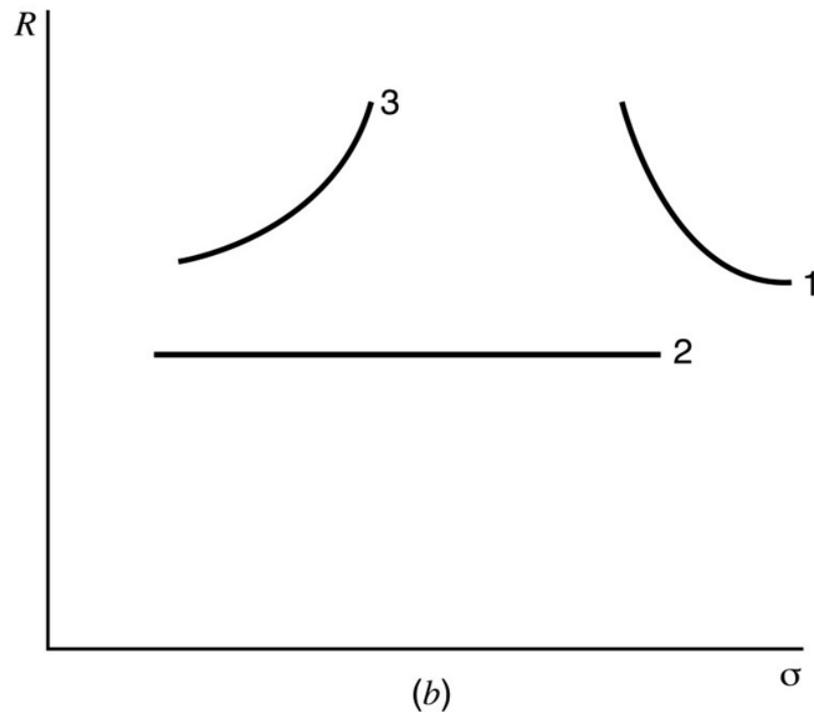
FIGURE 10-1 Characteristics of functions with different risk-aversion coefficients. (1) Utility function of a risk-seeking investor. (2) Utility function of a risk-neutral investor. (3) Utility function of a risk-averse investor.

Aversão absoluta ao risco

$$A(W) = \frac{-U''(W)}{U'(W)}$$

Table 10.7 Changes in Absolute Risk Aversion with Wealth

Condition	Definition	Property of $A(W)^a$	Example[b]
Increasing absolute risk aversion	As wealth increases hold fewer dollars in risky assets	$A'(W) > 0$	W^{-CW^2}
Constant absolute risk aversion	As wealth increases hold same dollar amount in risky assets	$A'(W) = 0$	$-e^{-CW}$
Decreasing absolute risk aversion	As wealth increases hold more dollars in risky assets	$A'(W) < 0$	$\ln W$

[a]$A'(W)$ is the first derivative of $A(W)$ with respect to wealth.
[b]The proof is left to the reader.

Aversão relativa ao risco

$$R(W) = \frac{-WU''(W)}{U'(W)} = WA(W)$$

Table 10.8 Changes in Relative Risk Aversion with Wealth

Condition	Definition	Property of $R'(W)$	Examples of Utility Functions
Increasing relative risk aversion	Percentage invested in risky assets declines as wealth increases	$R'(W) > 0$	$W - bW^2$
Constant relative risk aversion	Percentage invested in risky assets is unchanged as wealth increases	$R'(W) = 0$	$\ln W$
Decreasing relative risk aversion	Percentage invested in risky assets increases as wealth increases	$R'(W) < 0$	$-e^{2W-1\backslash2}$

- Considerações sobres as funções de utilidade.

- Outros modelos de escolha do portfólio, como alternativas aos modelos de utilidade.

- Maximizar a média geométrica dos retornos.

$$\overline{R}_{G_j} = \prod_{i=1}^{N} \left(1 + R_{ij}\right)^{P_{ij}} - 1$$

| | Securities | | | |
Outcome	A	B	C	Portfolio
1	0.80	−0.10	−0.20	0.16 2/3
2	−0.30	0.30	0.60	0.20
Geometric mean	0.12	0.08	0.13	0.18

- Safety first

$$\text{ROY} \qquad \min \text{Prob}(R_P < R_L)$$
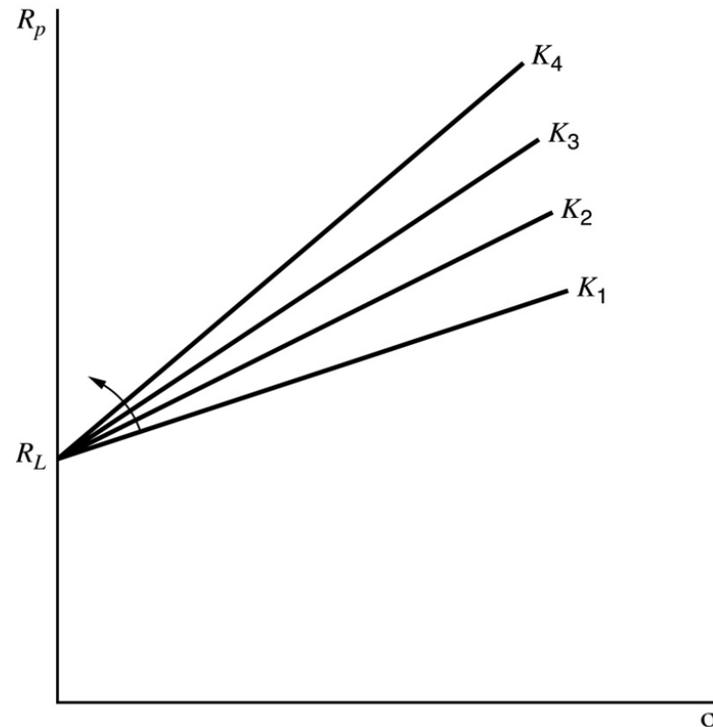
FIGURE 11-1 Lines of constant preference—Roy's criterion.

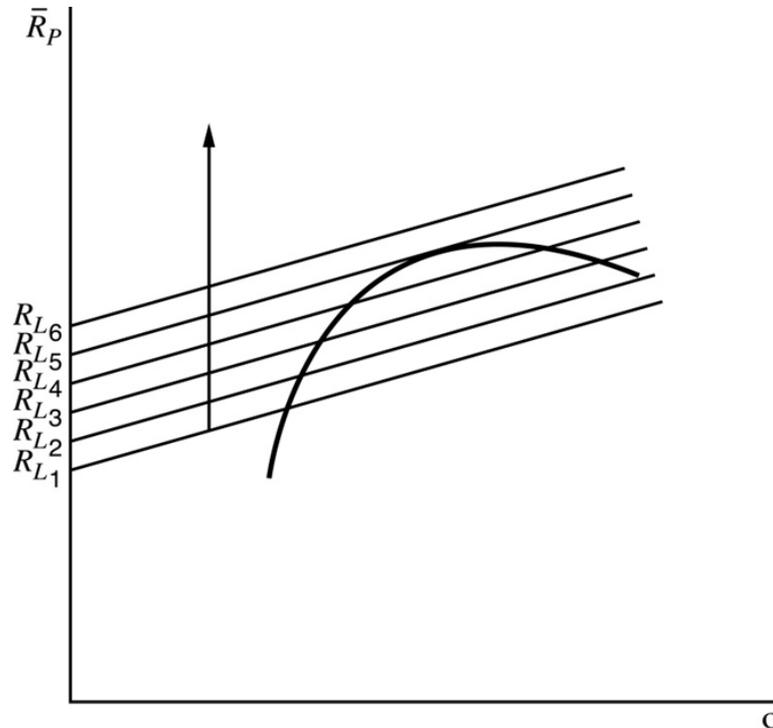$$\text{KATAOKA} \quad \max R_L \quad \text{Suj. a:} \quad \text{Prob}(R_P < R_L) \leq \alpha$$

FIGURE 11-2 The portfolio choice problem with Kataoka's safety first rule.

- A diversificação internacional.

Area or Country	Percent of Total[a]
Austria	0.1%
Belgium	0.4%
Denmark	0.4%
Finland	1.6%
France	5.5%
Germany	4.3%
Ireland	0.2%
Italy	2.1%
Netherlands	2.5%
Norway	0.2%
Portugal	0.2%
Spain	1.3%
Sweden	1.6%
Switzerland	2.8%
U.K.	9.7%
Europe	**32.8%**

(Table continues on next slide)

Table 12-1 Comparative Sizes of World Equity Markets 2000

Area or Country	Percent of Total[a]
Australia	1.1%
Hong Kong	1.0%
Japan	12.6%
Malaysia	0.5%
New Zealand	0.1%
Singapore	0.4%
Pacific	**15.5%**
Canada	2.1%
United States	49.5%
North America	**51.6%**
Total	**100.0%**

Source: From *Morgan Stanley Capital International Perspectives,* June 2000.
[a]Since the Morgan Stanley index does not include all shares traded in a market the proportions are approximate.
Column sums may not equal totals because of rounding.

Table 12-1 (continued)

Area or Country	Percent of Total
United States	47.0%
Euroland	22.9%
Japan	18.3%
United Kingdom	3.0%
Canada	1.7%
Switzerland	0.9%
Denmark	0.8%
Australia	0.6%
Sweden	0.6%
Norway	0.2%
New Zealand	0.1%
Asia	2.3%
Latin America	0.8%
Eastern Europe/Middle East/Africa	0.7%
Total	**100.0%**

Source: From Salomon Brothers.

Table 12-2 Comparative Sizes of Major Bond Markets 1999

	Australia	Austria	Belgium	Canada	France	Germany	Hong Kong	Italy	Japan	Netherlands	Spain	Sweden	Switzerland	United Kingdom	United States
Australia															
Austria	0.279														
Belgium	0.304	0.459													
Canada	0.608	0.316	0.299												
France	0.400	0.505	0.677	0.465											
Germany	0.393	0.671	0.612	0.454	0.749										
Hong Kong	0.501	0.350	0.225	0.572	0.387	0.395									
Italy	0.248	0.358	0.396	0.361	0.487	0.495	0.231								
Japan	0.430	0.245	0.317	0.355	0.415	0.307	0.289	0.330							
Netherlands	0.480	0.578	0.738	0.514	0.758	0.740	0.424	0.429	0.432						
Spain	0.460	0.422	0.523	0.455	0.681	0.606	0.415	0.575	0.482	0.599					
Sweden	0.490	0.364	0.348	0.486	0.600	0.639	0.393	0.480	0.461	0.577	0.693				
Switzerland	0.363	0.530	0.610	0.410	0.598	0.537	0.327	0.304	0.465	0.697	0.567	0.494			
United Kingdom	0.543	0.519	0.577	0.460	0.642	0.594	0.437	0.313	0.474	0.722	0.602	0.523	0.494		
United States	0.505	0.281	0.504	0.709	0.534	0.489	0.491	0.301	0.348	0.592	0.530	0.466	0.523	0.646	
Average Correlation Coefficient				0.475											

Table 12-3 Correlations among Stock Indexes Measured in U.S. Dollars

	Canada	France	Germany	Japan	Netherlands	Switzerland	U.K.
Canada							
France	0.191						
Germany	0.157	0.910					
Japan	0.112	0.391	0.495				
Netherlands	0.217	0.917	0.960	0.408			
Switzerland	0.076	0.697	0.803	0.540	0.751		
U.K.	0.433	0.599	0.580	0.314	0.614	0.467	
United States	0.567	0.456	0.357	0.177	0.430	0.257	0.478

Table 12-4 Correlations among Bond Indexes Measured in U.S. Dollars

	Canada	France	Germany	Japan	Netherlands	Switzerland	U.K.
Canada							
France	−0.178						
Germany	−0.163	0.978					
Japan	−0.015	0.393	0.426				
Netherlands	−0.167	0.983	0.998	0.422			
Switzerland	−0.146	0.915	0.933	0.477	0.931		
U.K.	−0.006	0.696	0.697	0.282	0.695	0.660	
United States	0.097	−0.073	−0.073	0.113	−0.068	−0.060	−0.106

Table 12-5 Correlations for Three-Month Bond Indexes Measured in U.S. Dollars

Stocks	Domestic Risk	Exchange Risk	Total Risk
Australia	13.94	8.66	17.92
Austria	24.80	10.59	24.50
Belgium	16.15	10.21	15.86
Canada	15.02	4.40	17.13
France	18.87	10.61	17.76
Germany	20.41	10.55	20.13
Hong Kong	29.75	0.43	29.79
Italy	24.55	11.13	25.29
Japan	22.04	12.46	25.70
Netherlands	16.04	10.59	15.50
Spain	22.99	11.18	23.27
Sweden	24.87	11.18	24.21
Switzerland	17.99	11.61	17.65
U.K.	14.45	10.10	15.59
United States	13.59	0.00	13.59
Equally Weighted Index (Non-U.S.)	21.57	10.03	23.43
Value-Weighted Index (Non-U.S.)			16.70

Table 12-6a Risk for U.S. Investor in Stocks 1990–2000

Stocks	Domestic Risk	Exchange Risk	Total Risk
Canada	8.67	4.40	10.75
France	8.71	10.61	12.61
Germany	5.38	10.55	11.20
Japan	9.18	12.46	15.10
Netherlands	7.03	10.59	11.68
Switzerland	6.64	11.61	12.06
U.K.	9.23	10.10	12.78
United States	7.89	0.00	7.90
Equally Weighted (Non-U.S.)	7.95	10.33	12.38
Value-Weighted Index (Non-U.S.)			9.45

Table 12-6b Risk for U.S. Investor in Bonds 1990–2000

Stocks	Domestic Risk	Exchange Risk	Total Risk
Canada	0.77	4.40	4.42
France	0.86	10.61	10.53
Germany	0.72	10.55	10.49
Japan	0.79	12.46	12.42
Netherlands	0.72	10.59	10.52
Switzerland	0.82	11.61	11.52
U.K.	0.82	10.10	10.04
United States	0.35	0.00	0.35
Equally Weighted Index (Non-U.S.)	0.79	10.33	10.27
Value-Weighted Index (Non-U.S.)			6.77

Table 12-6c Risk for U.S. Investor in Three-Month Securities 1990–2000

| X | Value-Weighted Index | | |
Proportion in World Index (%)	Stocks	Long-Term Bonds	T-Bills
0%	13.59	7.90	0.35
10%	13.28	7.63	0.75
20%	13.12	7.45	1.38
30%	13.10	7.37	2.05
40%	13.23	7.39	2.72
50%	13.51	7.52	3.39
60%	13.93	7.75	4.06
70%	14.47	8.06	4.74
80%	15.12	8.46	5.42
90%	15.87	8.93	6.09
100%	16.70	9.45	6.77

Table 12-7 Risk from Placing *X* Percent in a World Index Excluding U.S. Securities and the Rest in U.S. Index 1990–2000

Stocks	Own Country	Exchange Gain	To U.S. Investor
Australia	10.51	−2.82	7.69
Austria	2.37	−1.55	0.82
Belgium	11.85	−1.39	10.46
Canada	13.53	−2.29	11.24
France	14.78	−1.40	13.37
Germany	13.89	−1.56	12.32
Hong Kong	16.90	0.02	16.92
Italy	12.55	−4.34	8.22
Japan	−4.80	2.47	−2.32
Netherlands	17.38	−1.55	15.83
Spain	16.13	−4.17	11.96
Sweden	21.22	−3.40	17.81
Switzerland	15.81	−0.43	15.38
U.K.	12.71	−0.42	12.28
United States	16.17	0.00	16.17
Equally Weighted Index (Non-U.S.)	12.54	−2.22	10.31
Value-Weighted Index (Non-U.S.)			8.77

Table 12-8a Return to U.S. Investor in Stocks 1990–2000 (percent per annum)

Bonds	Own Country	Exchange Gain	To U.S. Investor
Canada	11.50	−2.08	9.42
France	11.08	−1.77	9.31
Germany	7.89	−1.89	6.00
Japan	8.13	3.62	11.75
Netherlands	8.84	−1.93	6.91
Switzerland	6.63	−0.55	6.08
U.K.	12.21	−0.54	11.67
United States	8.93		
Equally Weighted Index (Non-U.S.)	9.47	−0.73	8.73
Value-Weighted Index (Non-U.S.)			9.59
Three-Month Securities			
Canada	6.34	−2.16	4.18
France	6.44	−1.63	4.81
Germany	5.73	−1.82	3.91
Japan	2.72	3.67	6.39
Netherlands	5.58	−1.80	3.78
Switzerland	4.35	−0.38	3.97
U.K.	7.65	−0.44	7.21
United States	4.92		
Equally Weighted Index (Non-U.S.)	5.54	−0.65	4.89
Value-Weighted Index (Non-U.S.)			6.77

Table 12-8b Return to U.S. Investor in Bonds 1990–2000 (percent per annum)

Country	Mean Return		Variance	
	In Francs	In Dollars	In Francs	In Dollars
Australia	9.15	7.69	21.58	17.92
Austria	2.29	0.82	25.62	24.50
Belgium	11.92	10.46	16.77	15.86
Canada	12.70	11.24	21.73	17.13
France	14.78	13.37	18.87	17.76
Germany	13.79	12.32	21.02	20.13
Hong Kong	18.38	16.92	32.72	29.79
Italy	9.68	8.22	27.91	25.29
Japan	−0.86	−2.32	26.67	25.70
Netherlands	17.29	15.83	16.44	15.50
Spain	13.42	11.96	25.08	23.27
Sweden	19.28	17.81	26.37	24.21
Switzerland	16.84	15.38	18.67	17.65
U.K.	13.74	12.28	17.03	15.59
United States	17.63	16.17	18.45	13.59

Table 12-9 The effect of Country of Domicile on Mean Return and Risk

Country	U.S. Return	
	12%	16%
Australia	9.99	12.66
Austria	9.04	11.07
Belgium	9.53	11.88
Canada	11.36	14.94
France	10.19	12.98
Germany	10.35	13.24
Hong Kong	12.46	16.76
Italy	9.36	11.60
Japan	9.95	12.58
Netherlands	10.05	12.75
Spain	11.44	15.07
Sweden	10.98	14.30
Switzerland	10.08	12.79
U.K.	10.45	13.41
Equally Weighted Index (Non-U.S.)		
Value-Weighted Index (Non-U.S.)	10.17	12.95

Table 12-10 Minimum Returns on Foreign Markets Necessary for International Diversification to Be Justified

	1990–1999			
	Mean Return Monthly	Standard Deviation	Beta	Correlation with Market
Canada General Fund	1.05	4.27	0.92	0.93
Keystone International Fund	0.76	3.96	0.58	0.63
Japan Fund	0.76	7.08	0.41	0.25
Scudder International Fund	1.12	4.30	0.62	0.62
G.T. Pacific Fund	0.23	6.52	0.81	0.53
Alliance International Fund/A	0.65	4.55	0.66	0.62
Templeton Foreign Fund	0.98	3.88	0.60	0.66
T. Rowe Price International Stock Fund	1.00	4.30	0.63	0.64
Fidelity Overseas Fund	0.97	4.36	0.64	0.63
Vanguard World—International Growth	0.89	4.40	0.61	0.60
Managers Funds: International	1.06	3.68	0.56	0.66
Morgan Stanley Instl. Fund—International Eq.	1.12	3.93	0.53	0.58
Warburg Pincus International Equity	1.09	4.72	0.64	0.59
G.T. Global Growth—Europe Growth	0.78	4.90	0.71	0.62
T. Rowe Price International Discovery	1.17	5.41	0.54	0.43
Schroder Captial Funds: International	0.84	4.24	0.56	0.57
Smith Barney World Funds International	1.19	4.86	0.72	0.64
Thompson McKinnon Invest Trust Global	0.84	4.67	0.76	0.71
Fidelity International Growth and Income	1.01	4.05	0.58	0.62
Ivy Fund International	1.03	4.40	0.67	0.66
Average	0.93	4.62	0.64	0.61
S&P	1.48	3.58	1.00	1.00

Table 12-11 Performance Data on Stock Funds

| Fund Name | Sample Period (years) | Fund | | Beta | Correlation with Shearson-Lehman Index |
		Mean Return Monthly	Standard Deviation		
Fidelity Global Bond Fund	10	0.42%	1.85%	0.76	0.48
T. Rowe Price International Bond Fund	10	0.60%	2.41%	0.80	0.38
PaineWebber Master Global Income Fund	10	0.50%	1.32%	0.66	0.58
Putnam Global Governmental Income Trust	10	0.52%	1.85%	0.87	0.54
Scudder International Bond Fund	10	0.58%	2.05%	0.87	0.49
Morgan Stanley Dean Witter World Wide Inc.	10	0.46%	1.50%	0.78	0.60
Average	10.00	0.51%	1.83%	0.69	0.51

Table 12-12 Performance Data on Bond Funds

Return on International Portfolio Relative to U.S. Portfolio	15-Year Data Optimal Proportions		10-Year Data Optimal Proportions	
	U.S.	International	U.S.	International
+3	27%	73%	40%	60%
+2	40%	60%	53%	47%
+1	53%	47%	66%	34%
0	68%	32%	80%	20%
−1	85%	15%	96%	4%
−2	99%	1%	100%	0%
−3	100%	0%	100%	0%

R_F = the return on the riskless and = 6%,
$R_{S\&P}$ = the total return on the Standard and Poor index = 12%.

Table 12-13 Optimal Investment Proportions

- O Capital Asset Pricing Model (CAPM)

- Modelo de Sharpe-Lintner-Mossin de equilíbrio geral no mercado de capitais.
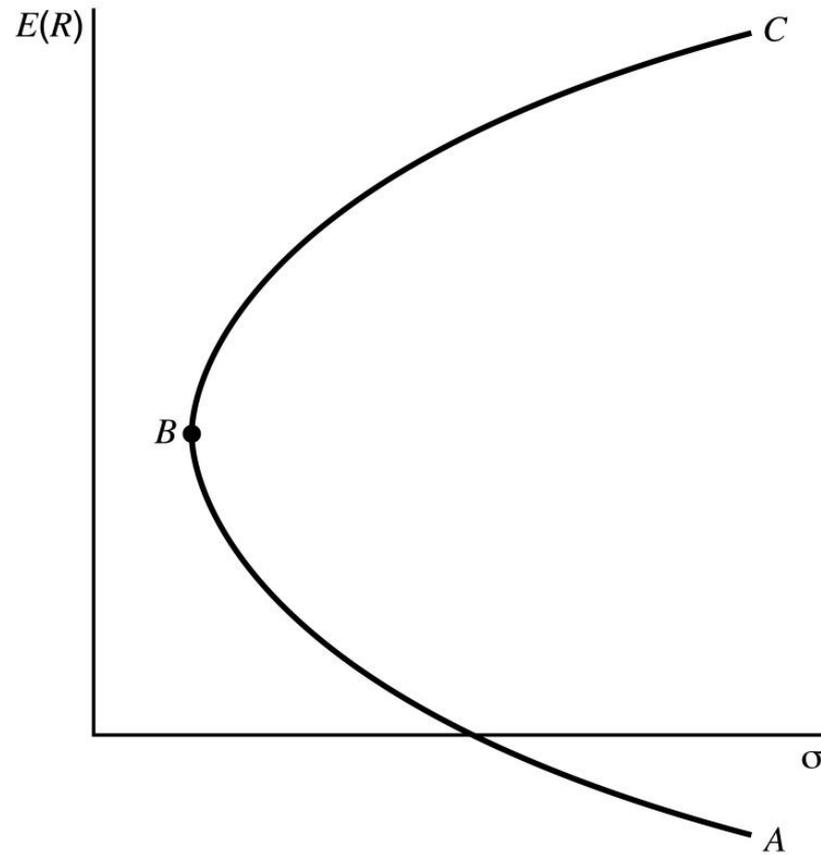
FIGURE 13-1 The efficient frontier—no lending and borrowing.
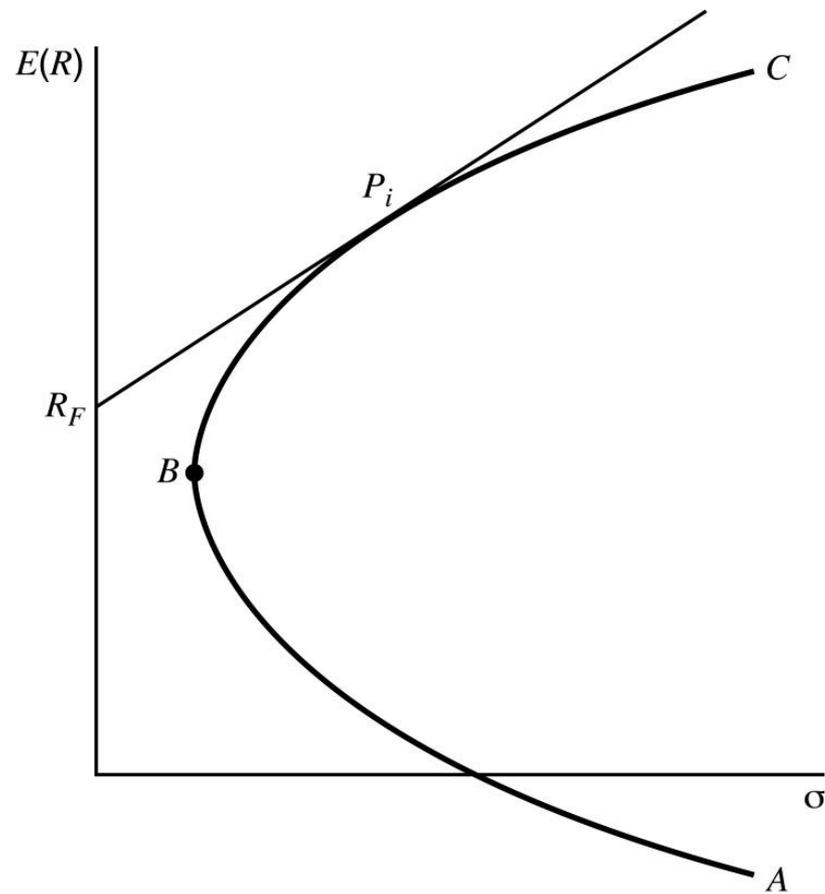
FIGURE 13-2 The efficient frontier with lending and borrowing.

Retorno Esperado = Preço do Tempo + Preço do Risco*
(Quantidade de Risco)

Linha do mercado de Capitais

$$\overline{R}_i = R_F + \frac{\overline{R}_m - R_F}{\sigma_m}\sigma_i$$

Investimento	Retorno Esperado	Beta
A	10	1
B	12	1.4
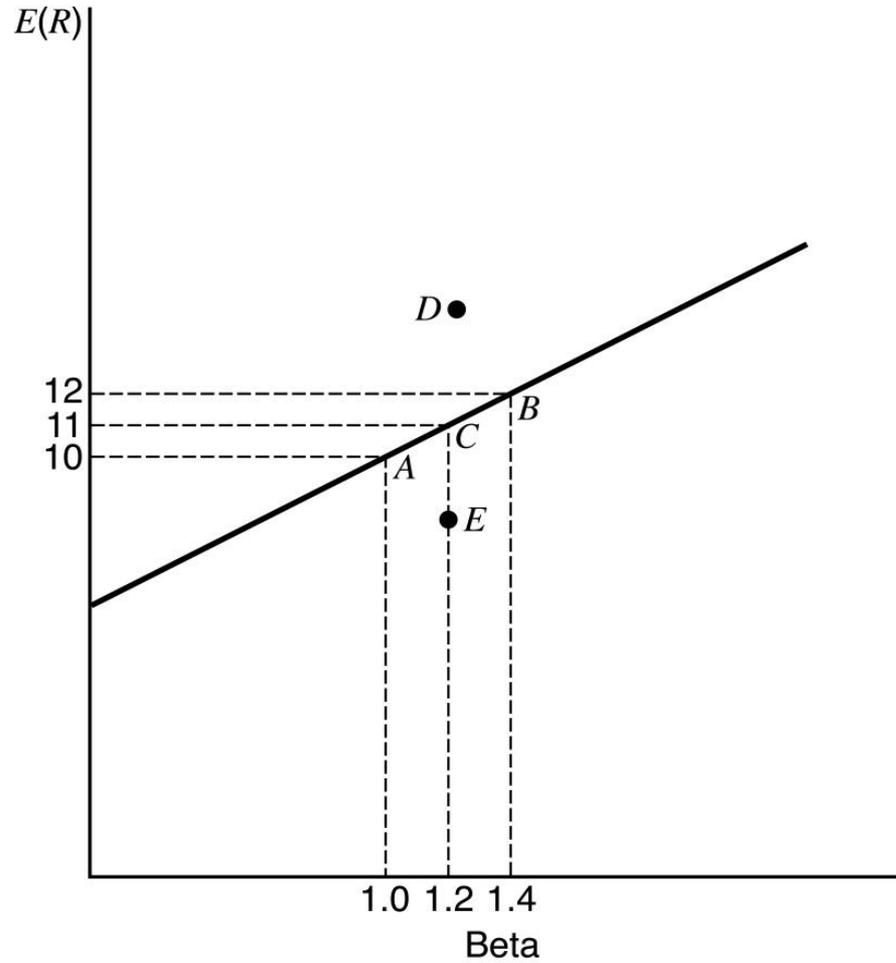
FIGURE 13-3 Combinations of portfolios.

Investimento	Dinheiro investido	Retorno esperado	Beta
C	-100	-11	-1,2
D	100	13	1,2
total	0	2	0
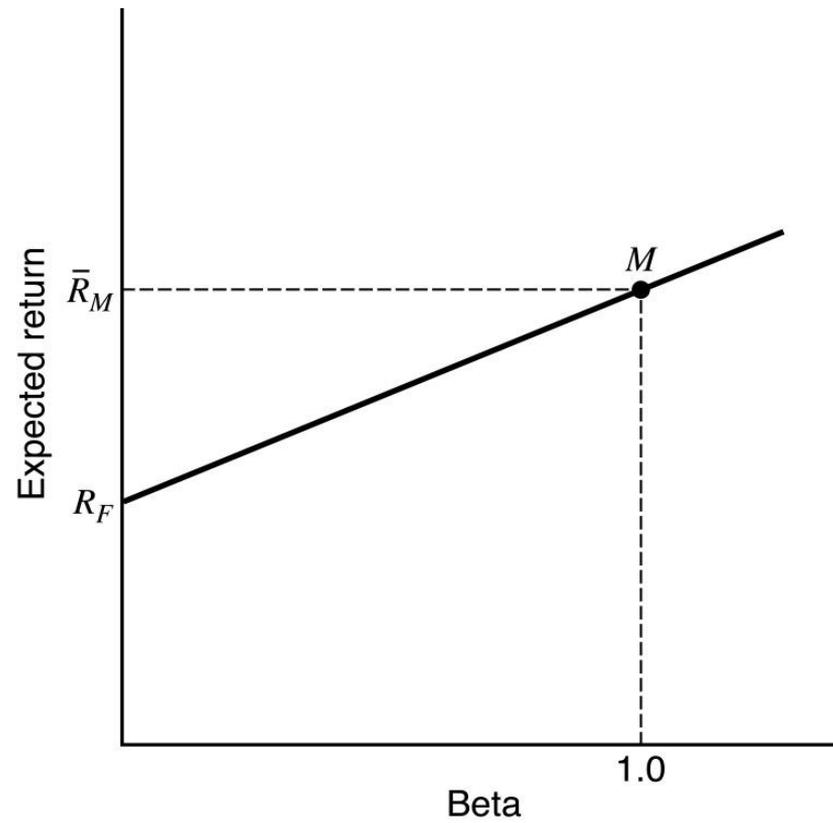
FIGURE 13-4 The security market line.

Linha do mercado de Capitais

$$\overline{R}_i = R_F + \frac{\overline{R}_m - R_F}{\sigma_m} \sigma_i$$

Linha do Mercado de Títulos

$$\overline{R}_i = R_F + \beta_i(\overline{R}_m - R_F)$$

- $\beta_i = \dfrac{\sigma_{im}}{\sigma_m^2}$

$$\overline{R}_i = R_F + \left(\frac{\overline{R}_m - R_F}{\sigma_m}\right)\frac{\sigma_{im}}{\sigma_m}$$
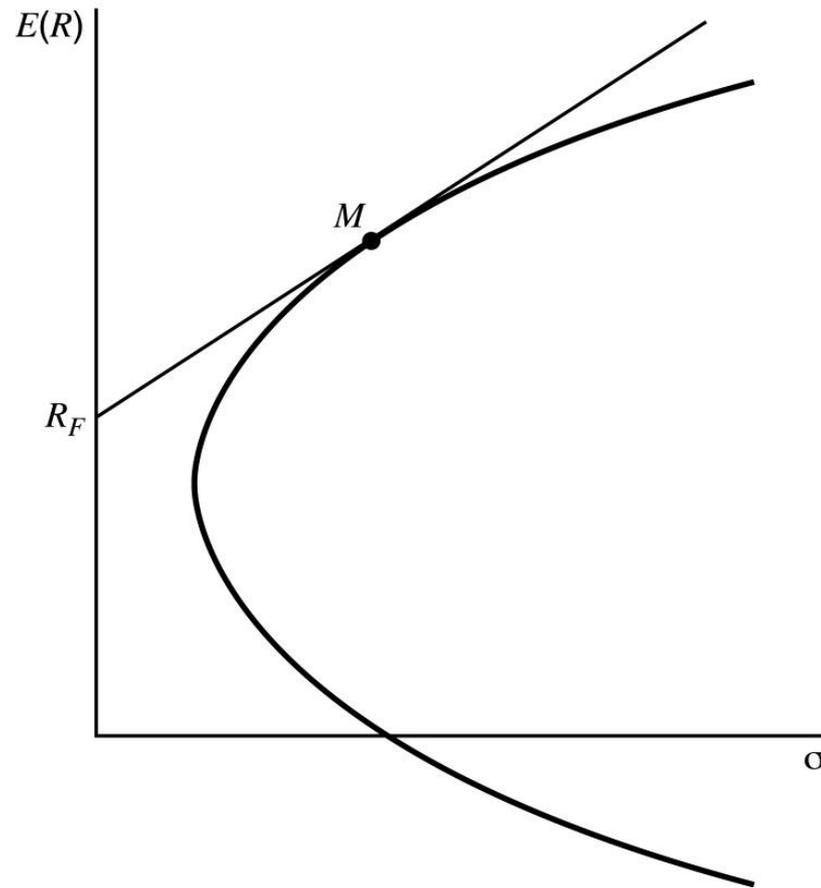
FIGURE 13-5 The efficient frontier.
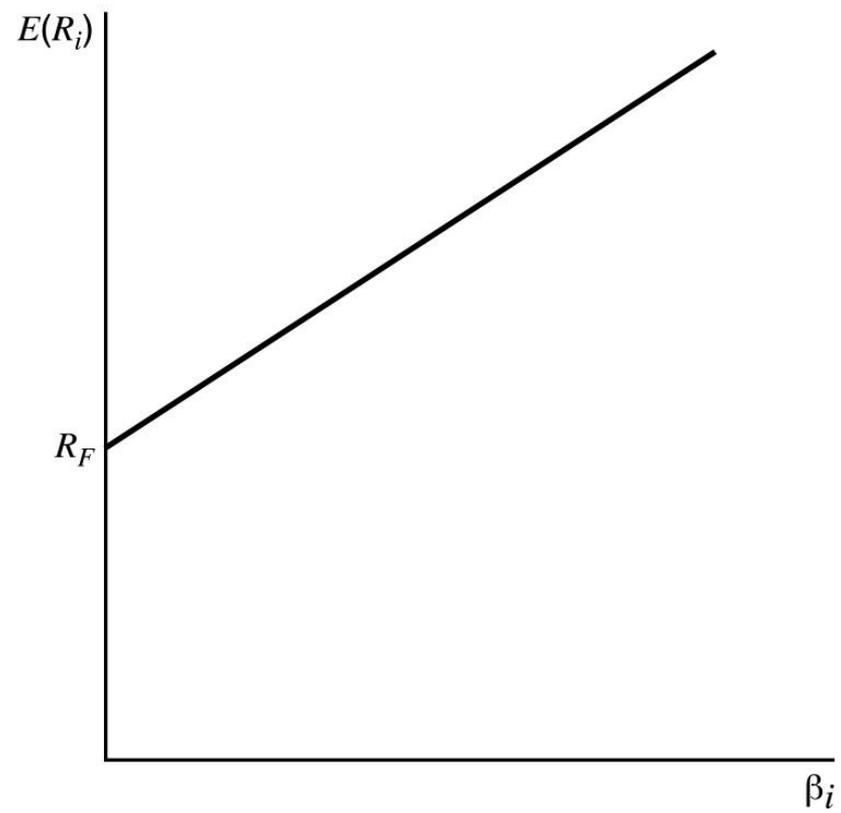
FIGURE 13-6 The security market line.

Variantes do CAPM:

1- Vendas a descoberto
2- Taxas de juro
3- Impostos pessoais
4- Activos não transaccionados em bolsa
5- Expectativas heterogéneas
6- Análise multi período.

1- Vendas a descoberto
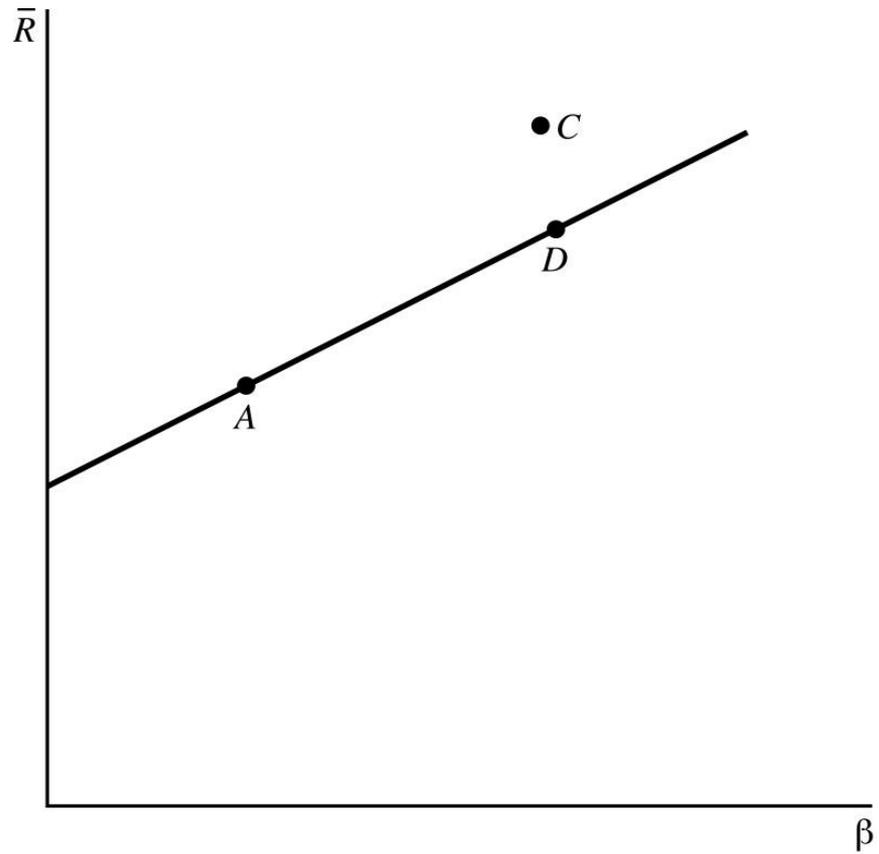
FIGURE 14-1 Portfolios in expected return Beta space.

2- Taxas de juro

2.1 Que não é possível emprestar ou pedir emprestado à taxa de juro sem risco.

Neste caso, procurar o portfolio com mínimo risco, aquele que é equivalente a ter um beta igual a zero, e fazer substituição de Rf por Rz sendo z o portfolio com mínimo risco:
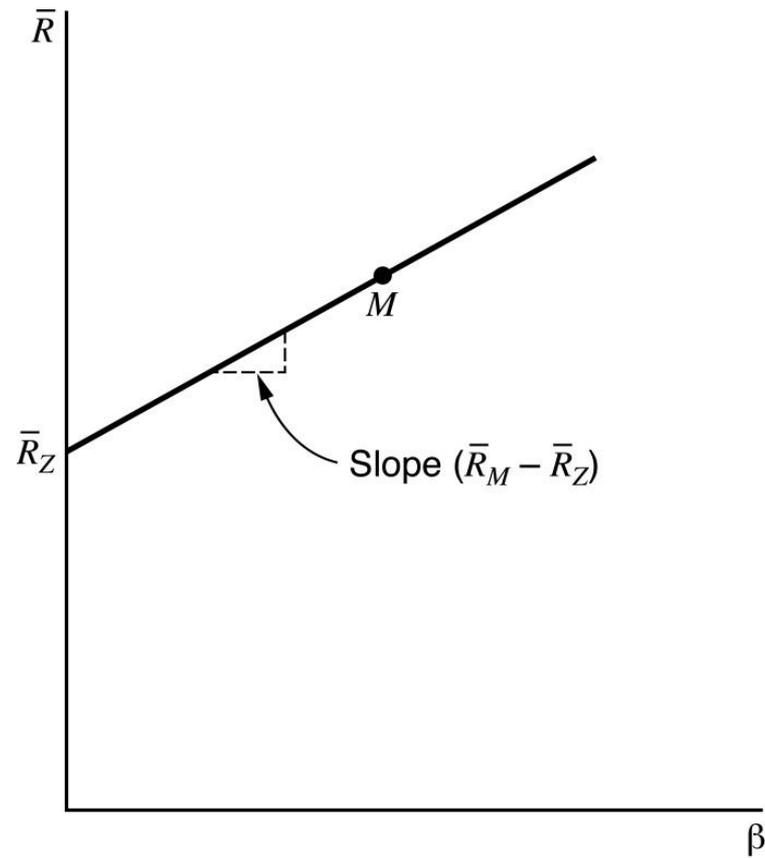
FIGURE 14-2 The zero Beta capital asset pricing line.
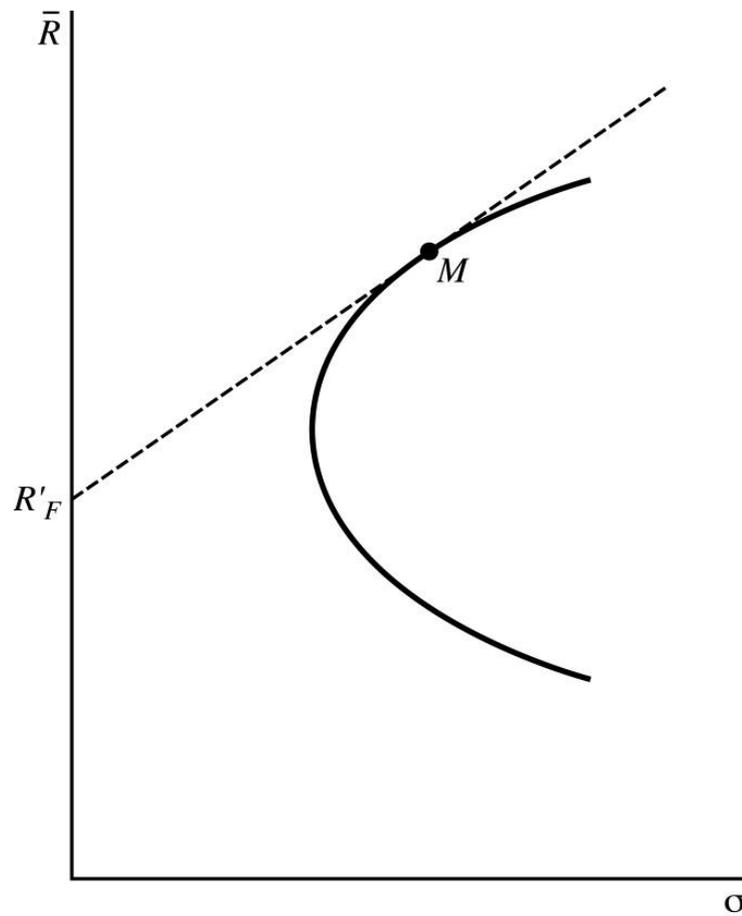
FIGURE 14-3 The opportunity set with rate R_F.
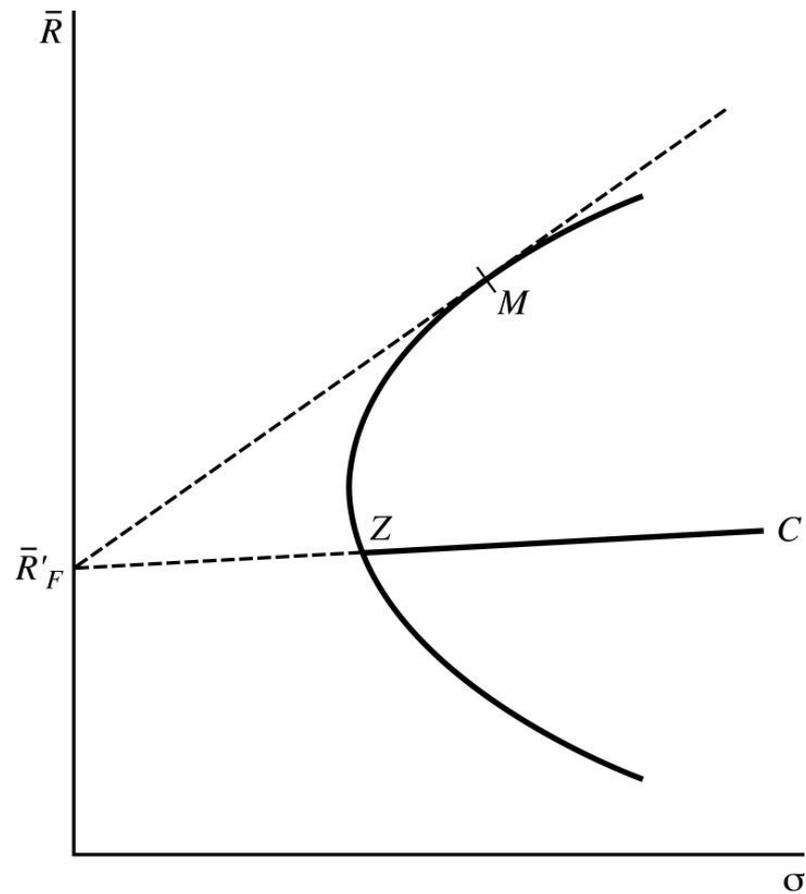
FIGURE 14-4 The location of portfolios with return $R9_F$.
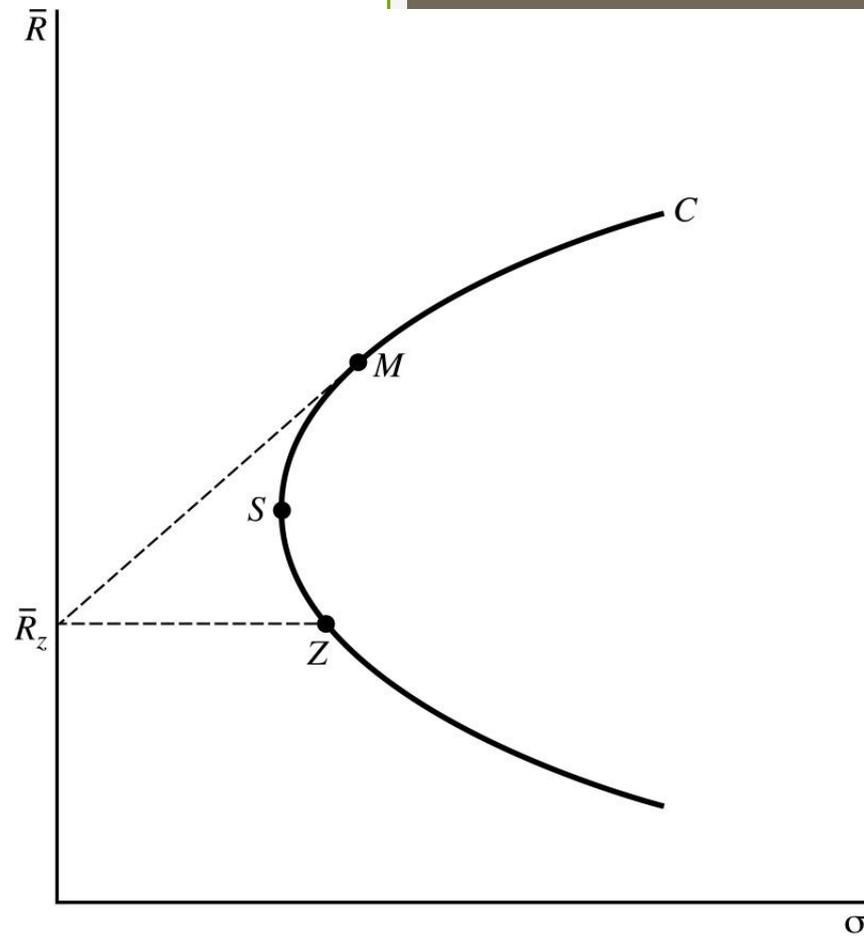
FIGURE 14-5 The minimum variance frontier.

2.2 Pode se emprestar mas não se pode pedir emprestado à taxa de juro sem risco.
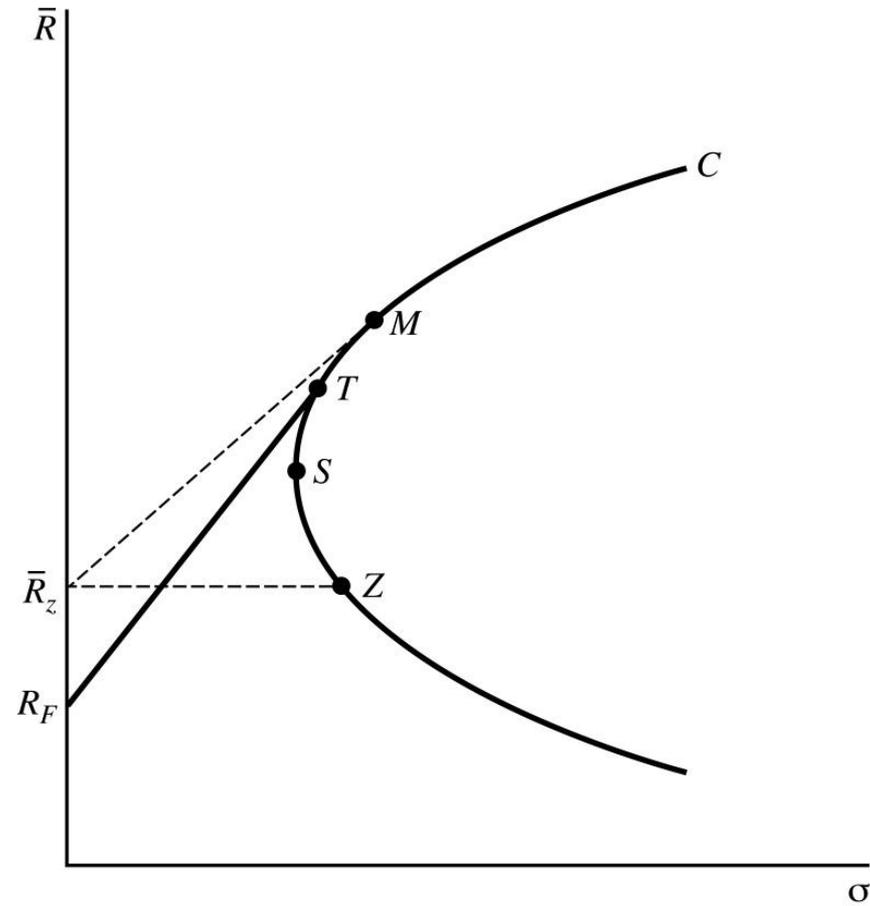
FIGURE 14-6 The opportunity set with riskless lending.
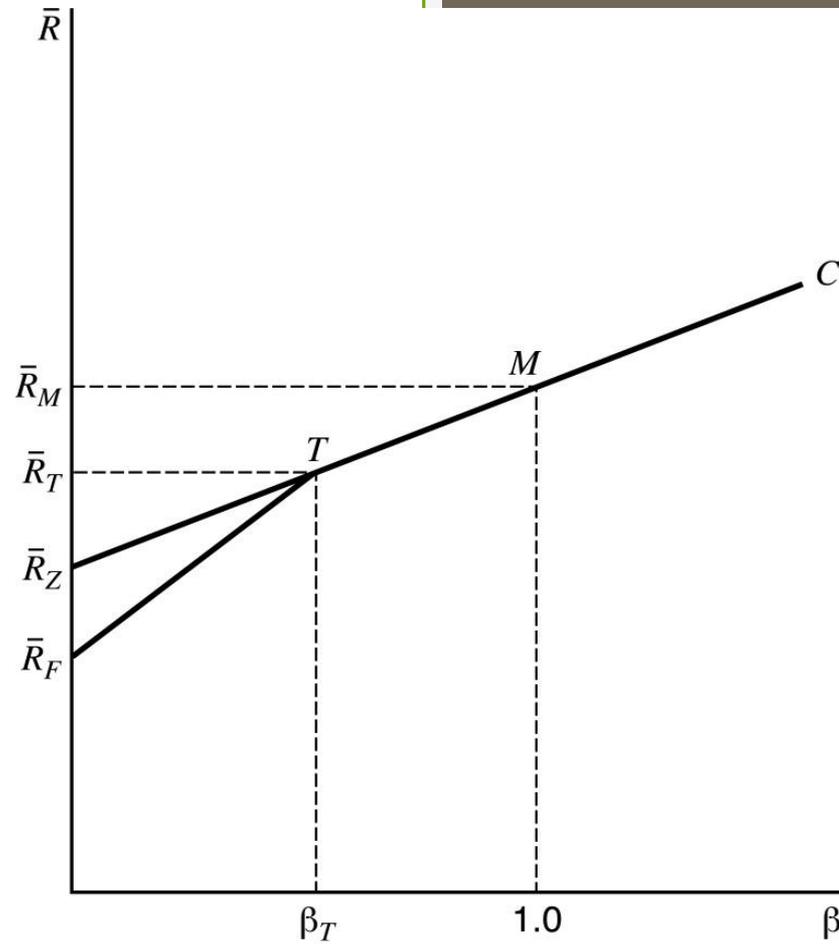
FIGURE 14-7 The location of investments in expected return Beta space.

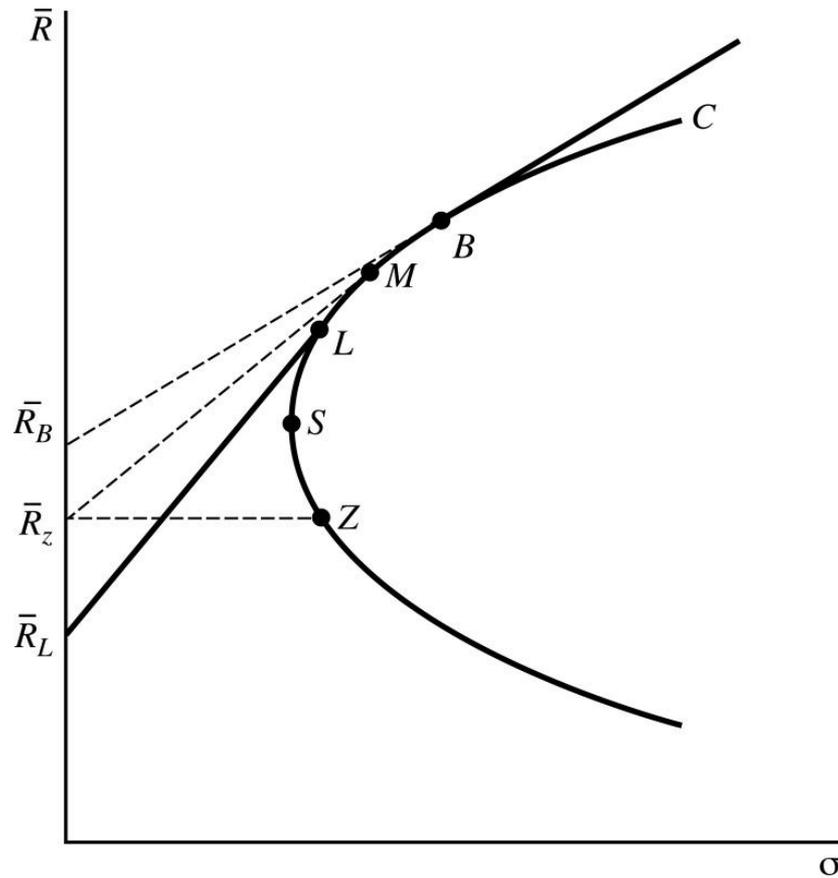2.2Existência de uma taxa de juro diferente para emprestar e pedir emprestado

FIGURE 14-8 The opportunity set with a differential lending and borrowing rate.

3- Existência de impostos pessoais

$$E(R_i) = R_F + \beta_i \left[\left(E(R_M) - R_F \right) - \tau (\delta_M - R_F) \right] + \tau (\delta_i - R_F)$$

(14.0)

where

δ_M = the dividend yield (dividends divided by price) of the market portfolio

δ_i = the dividend yield for stock i

τ = a tax factor that measures the relevant market tax rates on capital gains and income. τ is a complex function of investors' tax rates and wealth. However, it should be a positive number. See the appendix for further discussion.

4- Activos não transaccionados em bolsa

5- Expectativas heterogéneas

6- Análise multi período.

- The Arbitrage Pricing Model

$$R_i = a_i + b_{i1}I_1 + b_{i2}I_2 + \cdots + b_{ij}I_j + e_i \qquad (16.1)$$

where

a_i = the expected level of return for stock i if all indices have a value of zero

I_j = the value of the jth index that impacts the return on stock i

b_{ij} = the sensitivity of stock i's return to the jth index

e_i = a random error term with mean equal to zero and variance equal to σ_{ei}^2

For the model to fully describe the process generating security returns[2]:

$$E\left(e_i e_j\right) = 0 \qquad \text{for all } i \text{ and } j \text{ where } i \neq j$$

$$E\left[e_i\left(I_j - \bar{I}_j\right)\right] = 0 \qquad \text{for all stocks and indexes}$$

Portfolio	Expected Return	b_{i1}	b_{i2}
A	15	1.0	.6
B	14	.5	1.0
C	10	.3	.2

	Initial Cash Flow	End of Period Cash Flow	b_{i1}	b_{i2}
Portfolio D	+$100	−$113.0	−0.6	−0.6
Portfolio E	−$100	$115.0	0.6	0.6
Arbitrage portfolio	0	2.0	0	0

Attribute	Annualized Value of Associated λ	Percent of Months in Which Associated λ Was Significantly Different from Zero
Beta	5.36	58.3
Yield	0.24	39.5
Size	−5.56	56.5
Bond Beta	−0.12	28.2
Alpha	−2.00	43.5
Sector Membership		
Basic industries	1.65	32.5
Capital goods	0.16	18.7
Construction	−1.59	15.3
Consumer goods	−0.18	39.3
Energy	6.28	36.9
Finance	−1.48	16.3
Transportation	−0.57	43.9
Utilities	−2.62	35.0

Table 16-1 Cross-sectional Data on Sharpe's Multifactor Model

	Belgium	France	Canada	U.S.
Belgium	1.0			
France	0.65	1.0		
Canada	0.38	0.41	1.0	
United States	0.41	0.43	0.72	1.0

Table 16-2 Correlation Coefficient Between Returns in Four Countries

- Modelos mistos.

- a) Fama and French

- b) Chen, Roll and Ross

a) Fama and French

$$E(R_i) = R_f + [E(R_m) - R_f] b_i + s_i E(SMB) + h_i E(HML) + \varepsilon_i$$

SMB é a diferença entre o portfólio das pequenas e grandes (big) empresas.

HML é a diferença entre o portfolio das empresas com market to book elevado (high) e as empresas com market to book baixo (low)

b) Chen, Roll and Ross

Sector Name	I_1 Default	I_2 Term Structure	I_3 Deflation	I_4 Growth	I_5 Residual Market	R^2
Cyclical	−1.63	0.55	2.84	−1.04	1.14	0.77
Growth	−2.08	0.58	3.16	−0.92	1.28	0.84
Stable	−1.40	0.68	2.31	−0.22[a]	0.74	0.73
Oil	−0.63[a]	0.31	2.19[a]	−0.83[a]	1.14	0.50
Utility	−1.06	0.72	1.54	0.23[a]	0.62	0.67
Transportation	−2.07	0.58	4.45	−1.13	1.37	0.66
Financial	−2.48	1.00	3.20	−0.56[a]	0.99	0.72

[a]Indicates *not* statistically different from zero at the 5% level.

Exemplo de outros possíveis factores

- Crescimento económico
- Fase do ciclo de negócio
- Crescimento na indústria
- Taxa de câmbio face a outras divisas.
- Etc.

- Técnicas de avaliação de desempenho em fundos de investimento.

	Period			
	0	1	2	3
1. Value before inflow or outflow	$100	$110	$231	$55
2. Inflow (outflow)	0	$100	($181)	
3. Amount invested	$100	$210	$ 50	
4. Ending value	$110	$231	$ 55	

Table 24-1 Hypothetical Inflows and Outflows

			Period	
	0	1	2	3
Rate of return earned by each manager	20%	−10%	10%	
Fund A				
1. Value before inflow or outflow	100	240	126	$138.60
2. Inflow (outflow)	100	(100)	0	0
3. Amount invested	200	140	126	
4. Ending value	240	126	138.60	
Fund B				
1. Value before inflow or outflow	100	120	198	$107.80
2. Inflow (outflow)	0	100	(100)	0
3. Amount invested	100	220	98	
4. Ending value	120	198	107.80	

Table 24-2 Cashflows and Returns for Two Funds

Risk Class	Number in Sample		Mean Variance		Mean Return	
	Mutual Funds	Equally Weighted Random Portfolios[a]	Mutual Funds	Equally Weighted Random Portfolios[a]	Mutual Funds	Equally Weighted Random Portfolios[a]
Low Risk	43	62	0.00120	0.00118	0.102	0.128
Medium Risk	25	51	0.00182	0.00184	0.118	0.142
High Risk	18	50	0.00280	0.00279	0.138	0.162

[a]NYSE stocks only, assuming an equal investment as of beginning of period in each stock included.
Source: Friend, Blume, and Crockett [30].

Table 24-3 Characteristics of Investment Performance of Mutual Funds and Random Portfolios with Variance as a Measure of Risk (Jan. 1960–June 1968)

Risk Class	Number in Sample		Mean Beta Coefficient		Mean Return			
	Mutual Funds	Equally Weighted Random Portfolios[a]	Mutual Funds	Equally Weighted Random Portfolios	Mutual Funds	Equally Weighted Random Portfolios	Proportionally Weighted Random Portfolios, Variant 1	Proportionally Weighted Random Portfolios, Variant 2
Low risk ($\beta = 0.5-0.7$)	28	17	0.614	0.642	0.091	0.128	0.116	0.101
Medium risk ($\beta = 0.7-0.9$)	53	59	0.786	0.800	0.106	0.131	0.097	0.084
High risk ($\beta = 0.9-1.1$)	22	60	0.992	0.992	0.135	0.137	0.103	0.092

[a]Approximately the same number in a group for each of the variants.
Source: Friend, Blume, and Crockett [30].

Table 24-4 Comparison of Investment Performance of Mutual Funds and Random Portfolios (Jan. 1960–June 1968)

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
5th Percentile	20.6	23.4	7.1	64.5	3.4	35.7	38.0	20.2	6.0	18.8
25th Percentile	14.7	16.3	2.7	50.8	−0.7	30.1	30.9	15.3	3.0	16.0
Median	11.4	12.1	−1.0	44.1	−3.7	27.3	26.1	12.5	0.6	14.5
75th Percentile	9.0	7.6	−4.4	39.5	−8.0	24.5	22.5	10.3	−1.7	12.8
95th Percentile	5.0	1.1	−10.6	29.8	−13.3	20.1	16.6	5.9	−6.9	10.8
Fund H1874	9.2	11.2	0.3	47.2	1.5	29.5	32.2	11.5	0.9	14.1
Percent Rank	73	58	41	37	12	30	18	60	44	55

Source: Reprinted from S.E.I. Fund Evaluation Service with permission.

Table 24-5 Balanced Funds: Total Fund Rates of Return (for Years Ending June 30)

	1980–1984	1981–1985	1982–1986	1983–1987	1984–1988	1985–1989
5th Percentile	15.9	14.9	15.5	14.8	16.3	15.7
25th Percentile	13.5	11.6	12.9	13.1	13.7	12.6
Median	12.0	10.3	11.4	11.1	12.1	10.8
75th Percentile	10.4	9.1	9.6	9.6	10.1	9.2
95th Percentile	9.0	7.6	7.5	7.4	7.6	7.0
Fund H1874	11.7	10.4	11.3	10.0	10.1	9.7
Percent rank	53	49	52	70	75	67
Rates of return	12.7	16.6	20.7	23.3	14.3	17.0
Percent rank	23	14	6	15	19	38

Source: Reprinted from S.E.I. Fund Evaluation Service with permission.

Table 24-6 Balanced Funds: Total Fund Variability of Quarterly Returns for Moving Five-Year Periods Ending June 30

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
5th Percentile	20.6	23.4	7.1	64.5	3.4	35.7	38.0	20.2	6.0	18.8
25th Percentile	14.7	16.3	2.7	50.8	−0.7	30.1	30.9	15.3	3.0	16.0
Median	11.4	12.1	−1.0	44.1	−3.7	27.3	26.1	12.5	0.6	14.5
75th Percentile	9.0	7.6	−4.4	39.5	−8.0	24.5	22.5	10.3	−1.7	12.8
95th Percentile	5.0	1.1	−10.6	29.8	−13.3	20.1	16.6	5.9	−6.9	10.8
Fund H1874	9.2	11.2	0.3	42.2	1.5	29.5	32.2	11.5	0.9	14.1
Percent rank	73	58	41	37	12	30	18	60	44	55
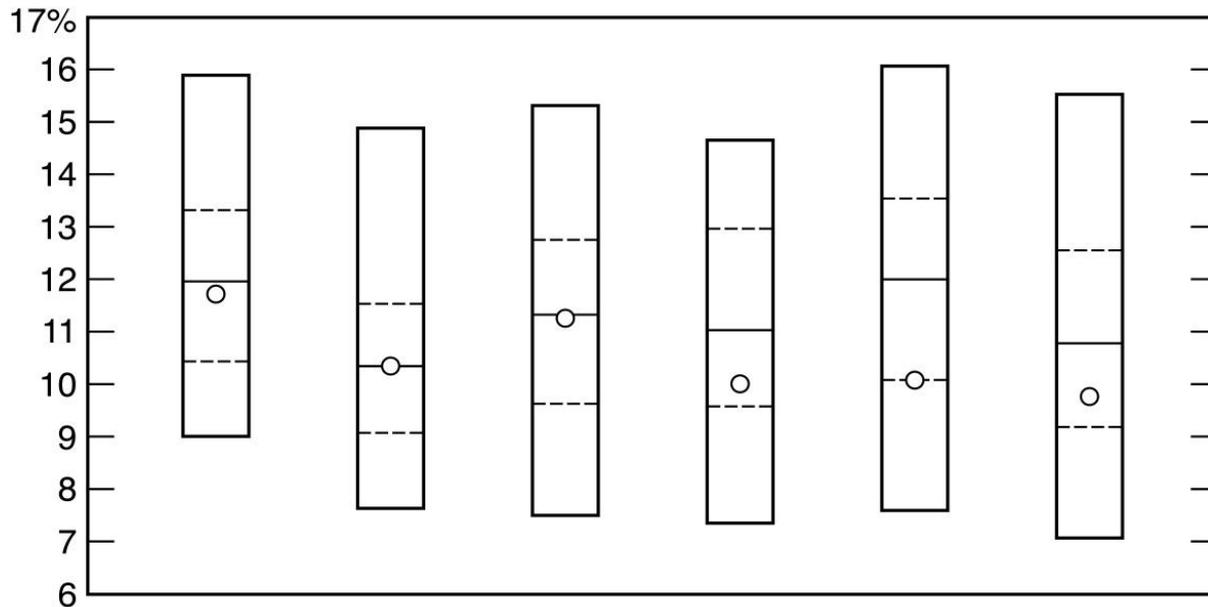
	1980-1984	1981-1985	1982-1986	1983-1987	1984-1988	1985-1989
5th Percentile	15.9	14.9	15.5	14.8	16.3	15.7
25th Percentile	13.5	11.6	12.9	13.1	13.7	12.6
Median	12.0	10.3	11.4	11.1	12.1	10.8
75th Percentile	10.4	9.1	9.5	9.6	10.1	9.2
95th Percentile	9.0	7.5	7.5	7.4	7.6	7.0
Fund H1874	11.7	10.4	11.3	10.0	10.1	9.7
Percent rank	53	49	52	70	75	67
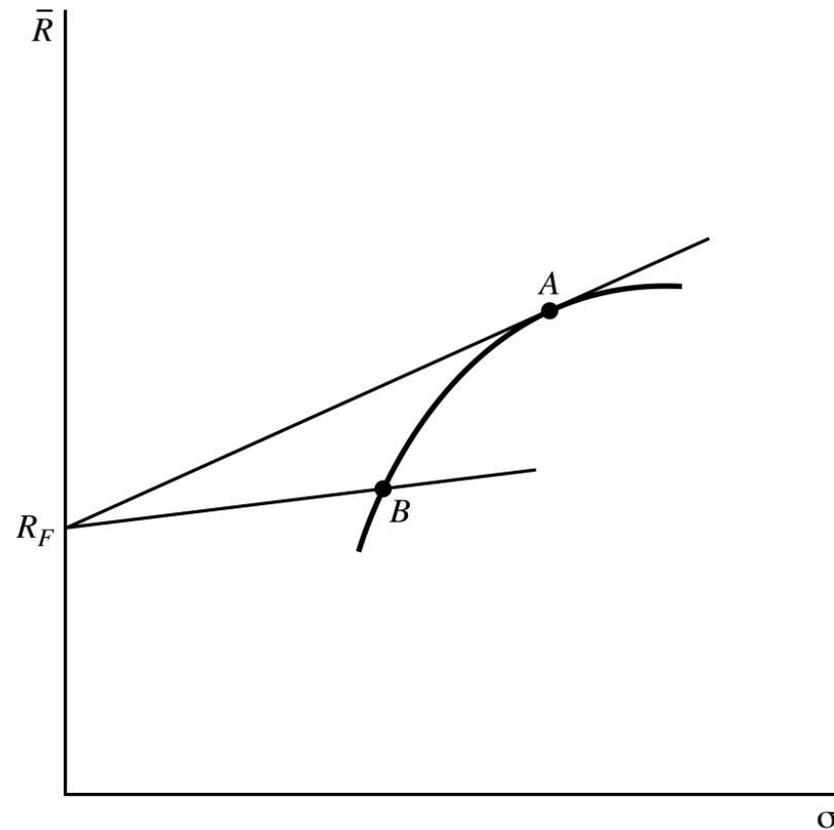
FIGURE 24-1 Combinations of a riskless asset and a risky portfolio

Índice de Sharpe - Excesso de rendibilidade em relação ao desvio padrão

$$S_h = \frac{\overline{R}_P - R_F}{\sigma_P}$$
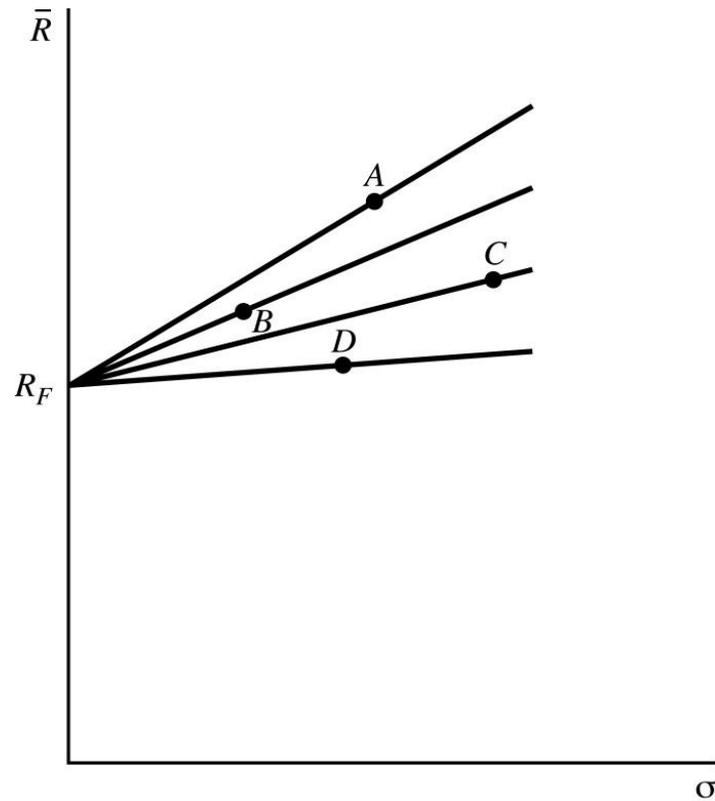
FIGURE 24-2 Combinations of a riskless asset and some mutual funds.
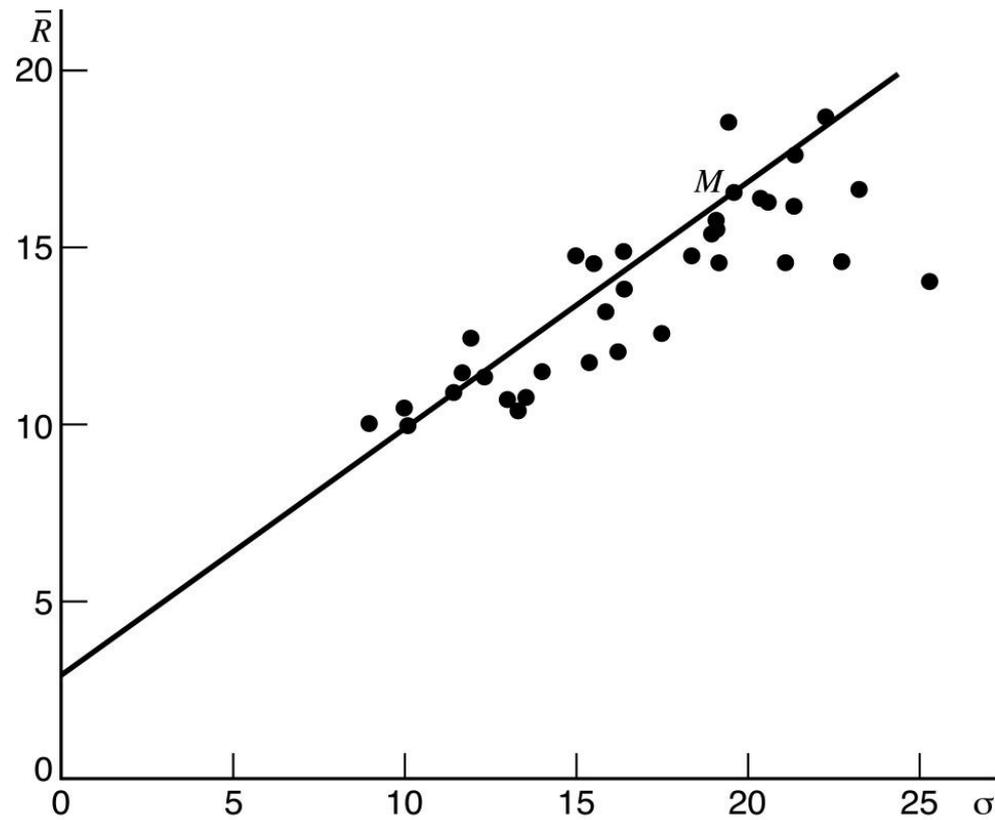
FIGURE 24-3 Funds in Expected Return Standard deviation space.

Mutual Fund	Average Annual Excess Return (%)	Variability of Annual Return (%)	Reward-to-Variability Ratio $(R/V)^a$
Affiliated Fund	11.6	15.3	0.75896
American Business Shares	7.0	9.2	0.75876
Axe-Houghton, Fund A	7.5	13.5	0.55551
Axe-Houghton, Fund B	9.0	16.3	0.55183
Axe-Houghton, Stock Fund	8.9	15.6	0.56991
Boston Fund	9.4	12.1	0.77842
Broad Street Investing	11.8	16.8	0.70329
Bullock Fund	12.7	19.3	0.65845
Commonwealth Investment Company	7.9	13.7	0.57841
Delaware Fund	11.4	21.4	0.58253
Dividend Shares	11.4	15.9	0.71807
Eaton and Howard, Balanced Fund	8.0	11.9	0.67399
Eaton and Howard, Stock Fund	12.2	19.2	0.63486
Equity Fund	11.6	18.7	0.61902
Fidelity Fund	13.4	23.5	0.57020
Financial Industrial Fund	11.5	23.0	0.49971
Fundamental Investors	13.0	21.7	0.59894
Group Securities, Common Stock Fund	12.1	19.1	0.63316

(Table continues on next slide)

Table 24-7 Performance of 34 Mutual Funds, 1954–1963

Mutual Fund	Average Annual Excess Return (%)	Variability of Annual Return (%)	Reward-to-Variability Ratio $(R/V)^a$
Group Securities, Fully Administered Fund	8.4	14.1	0.59490
Incorporated Investors	11.0	25.5	0.43116
Investment Company of America	14.4	21.8	0.66169
Investors Mutual	8.3	12.5	0.66451
Loomis-Sales Mutual Fund	7.0	10.4	0.67358
Massachusetts Investors Trust	13.2	20.8	0.63398
Massachusetts Investors—Growth Stock	15.6	22.7	0.63687
National Investors Corporation	15.3	19.9	0.76798
National Securities—Income Series	9.4	17.8	0.52950
New England Fund	7.4	10.2	0.72703
Putnam Fund of Boston	10.1	16.0	0.63222
Scudder, Stevens & Clark Balanced Fund	7.7	13.3	0.57893
Selected American Shares	11.4	19.4	0.58788
United Funds—Income Fund	13.1	20.9	0.62698
Wellington Fund	8.3	12.0	0.69057
Wisconsin Fund	10.8	16.9	0.64091

^{a}R/V ratio = (Average return − 3.0%)/variability. The ratios shown were computed from original data and thus differ slightly from the ratios obtained from the rounded data shown in the table.

Source: Sharpe [75].

Table 24-7 (continued)
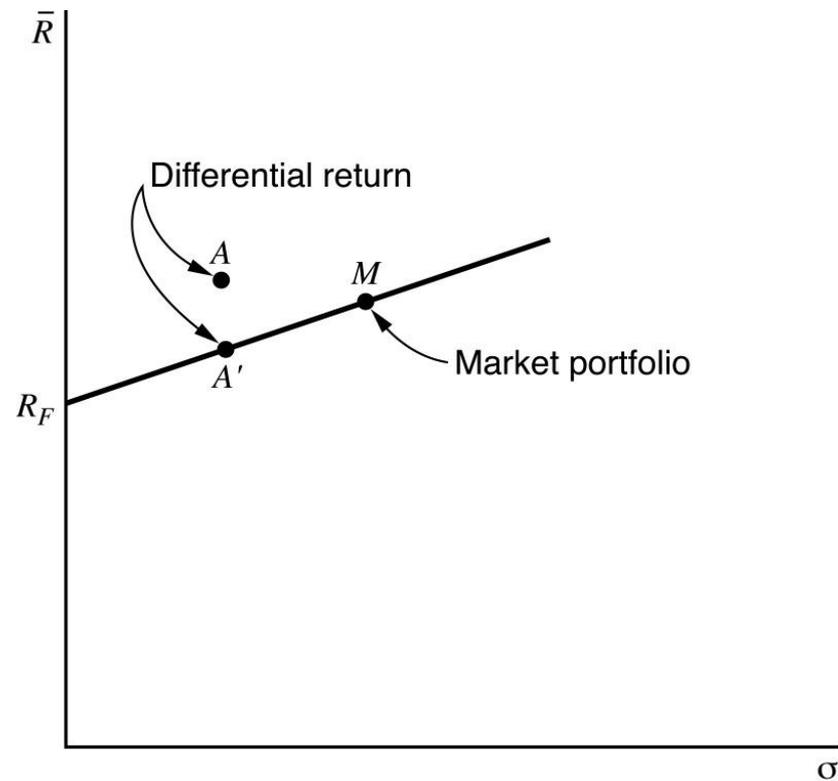
FIGURE 24-4 The determination of differential return.

Diferencial de Rendibilidade com medida de risco dada pelo desvio padrão

$$\text{Dif. Rend.} = \gamma = R_P - \overline{R}_P = R_P - \left[R_F + \left(\frac{\overline{R}_m - R_F}{\sigma_m} \right) \sigma_P \right]$$
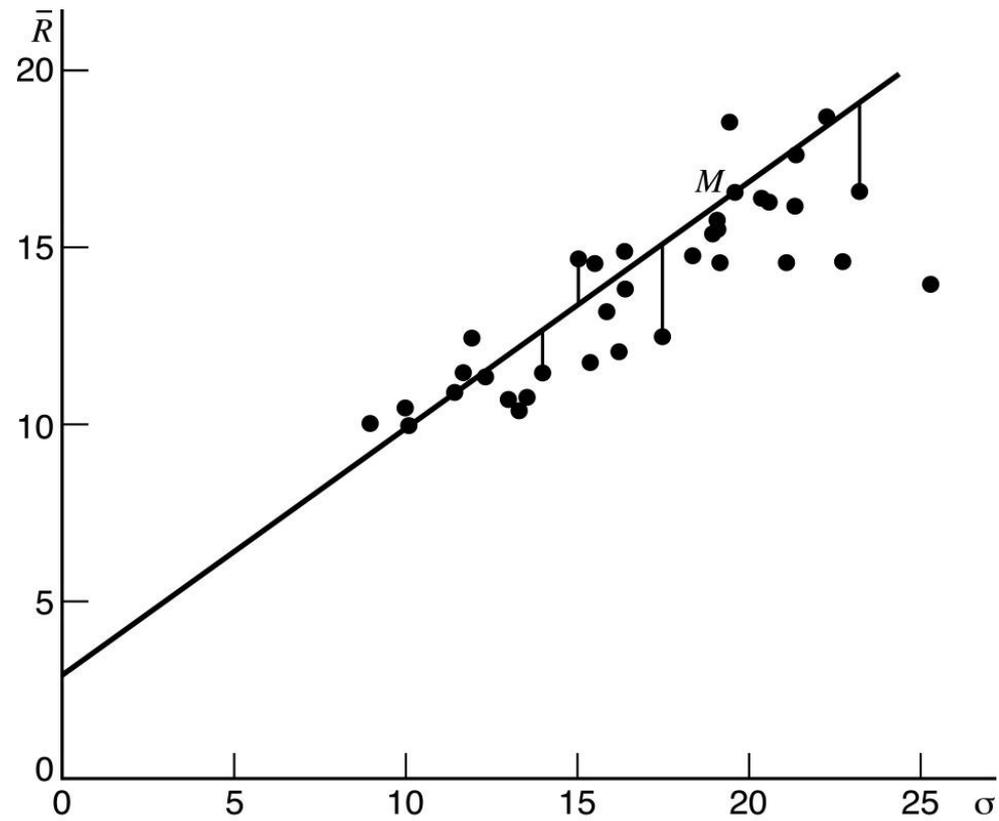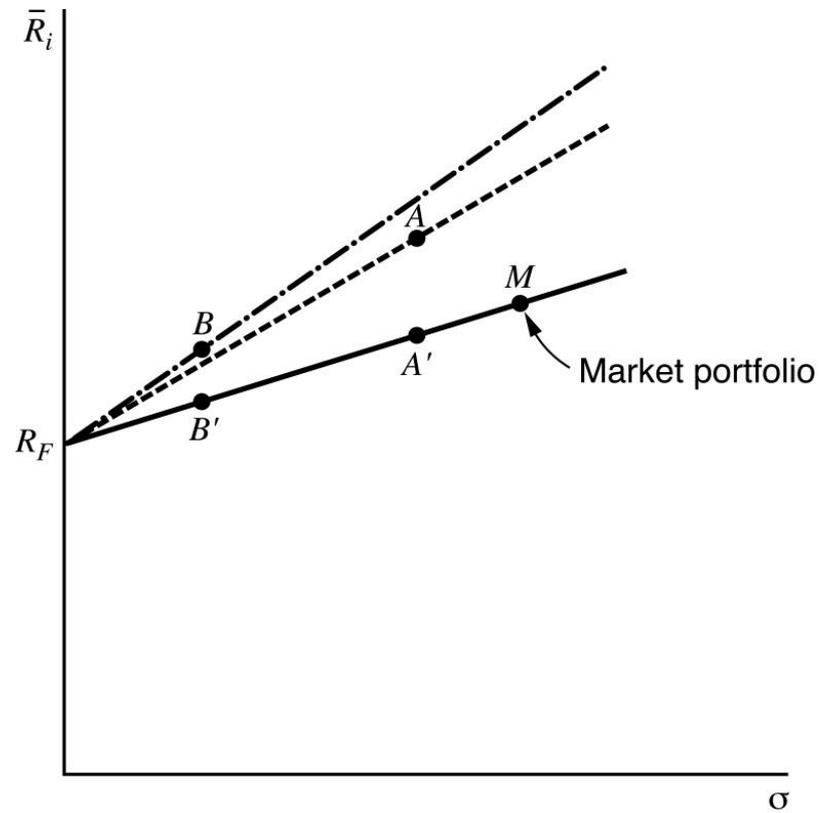
FIGURE 24-5 Measuring differential return.

FIGURE 24-6 Effect of measure on ranking.

	Average Annual Return	Return on a Portfolio of the Same Risk[a]	Differential Return
Affiliated Fund	14.6	13.20	1.40
American Business Shares	10.0	9.14	0.86
Axe-Houghton, Fund A	10.5	12.00	−1.50
Axe-Houghton, Fund B	12.0	13.87	−1.87
Axe-Houghton, Stock Fund	11.9	13.40	−1.50
Boston Fund	12.4	11.07	1.33
Broad Street Investing	14.8	14.21	0.59
Bullock Fund	15.7	15.87	−0.17
Commonwealth Investment Company	10.9	12.14	−1.24
Delaware Fund	14.4	17.27	−2.87
Dividend Shares	14.4	13.61	−0.79
Eaton and Howard, Balanced Fund	11.0	10.94	0.06
Eaton and Howard, Stock Fund	15.2	15.81	−0.61
Equity Fund	14.6	15.47	−0.87
Fidelity Fund	16.4	18.67	−2.27
Financial Industrial Fund	14.5	18.34	−3.80

(Table continues on next slide)

Table 24-8 Differential Returns with Standard Deviation as a Measure of Risk

	Average Annual Return	Return on a Portfolio of the Same Risk[a]	Differential Return
Fundamental Investors	16.0	17.47	−1.47
Group Securities, Common Stock Fund	15.1	15.74	−3.64
Group Securities, Fully Administered Fund	11.4	12.40	−1.00
Incorporated Investors	14.0	20.01	−6.01
Investment Company of America	17.4	17.54	−0.14
Investors Mutual	11.3	11.34	−0.04
Loomis-Sales Mutual Fund	10.0	9.94	0.06
Massachusetts Investors Trust	16.2	16.87	−0.67
Massachusetts Investors—Growth Stock	18.6	18.14	0.46
National Investors Corporation	18.3	16.27	2.03
National Securities—Income Series	12.4	14.87	−2.47
New England Fund	10.4	9.80	−0.60
Putnam Fund of Boston	13.1	13.67	0.57
Scudder, Stevens & Clark Balanced Fund	10.7	11.87	−1.17
Selected American Shares	14.4	15.94	−1.54
United Funds—Income Fund	16.1	16.94	−0.84
Wellington Fund	11.3	11.00	0.30
Wisconsin Fund	13.8	14.27	−0.47

[a]Obtained by a mixture of market and risk-free rate.
Source: Sharpe [75].

Table 24-8 (continued)
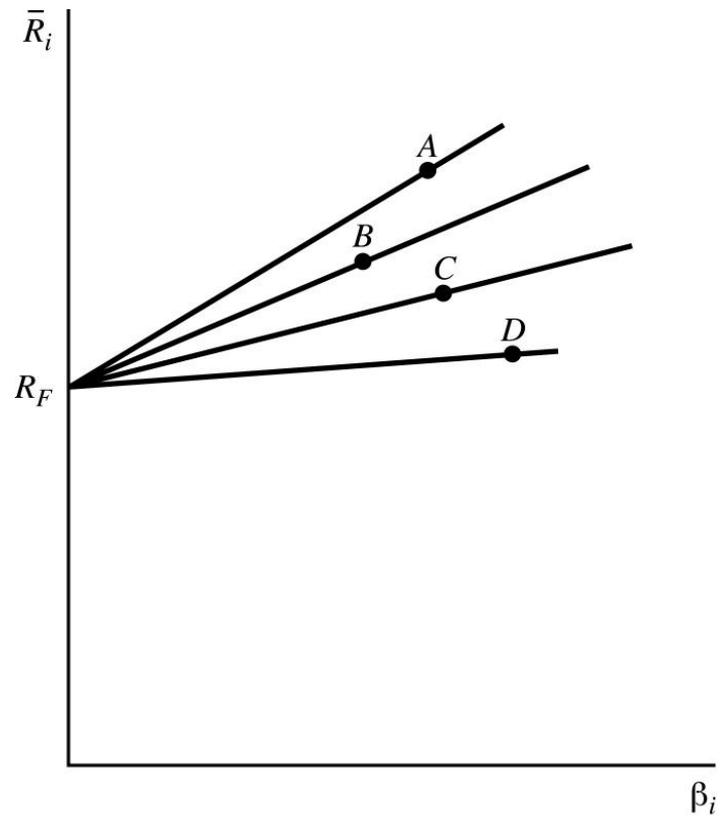
FIGURE 24-7 Treynor measure.

Índice de Treynor - Excesso de Rendibilidade em relação ao risco não diversificável

$$T = \frac{\overline{R}_P - R_F}{\beta_P}$$

				Average Values (Unweighted)			
Evaluation Period	Beta Range	No. Funds	Number of Observations (months)	Monthly Fund Return (%/month)	Average Beta	Monthly Market Return (%/month)	Differential Return
Jan. 1960	0−0.4	3	120	0.43	0.23	0.77	0.007
to	0.4−0.8	35	120	0.63	0.68	0.77	0.004
Dec. 1969	0.8−1.0	44	120	0.79	0.91	0.77	0.066
	1.0−1.2	30	120	0.86	1.07	0.77	0.056
	1.2+	13	120	1.05	1.33	0.77	0.130
	Total	125	120	0.78	0.91	0.77	0.051
Jan. 1960	0−0.4	4	60	0.60	0.16	1.05	0.245
to	0.4−0.8	47	60	0.83	0.65	1.05	0.064
Dec. 1964	0.8−1.0	43	60	0.82	0.91	1.05	−0.157
	1.0−1.2	22	60	0.73	1.11	1.05	−0.415
	1.2+	9	60	1.14	1.30	1.05	−0.162
	Total	125	60	0.82	0.85	1.05	−0.107
Jan. 1965	0−0.4	3	60	0.17	0.26	0.49	−0.250
to	0.4−0.8	22	60	0.46	0.69	0.49	0.001
Dec. 1969	0.8−1.0	46	60	0.68	0.91	0.49	0.194
	1.0−1.2	30	60	0.73	1.08	0.49	0.236
	1.2+	24	60	1.20	1.41	0.49	0.673
	Total	125	60	0.74	0.99	0.49	0.252

Source: SEC study [74].

Table 24-9 Performance Summary—All Funds with Complete Data for 1960-1969 Period
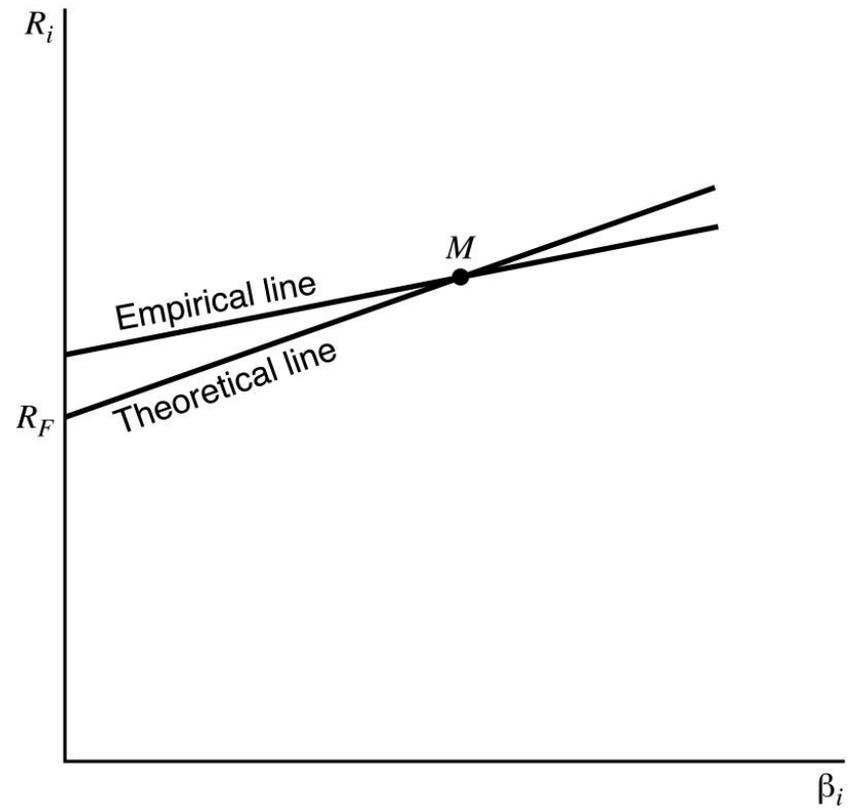
FIGURE 24-8 Empirical and theoretical CAPM.
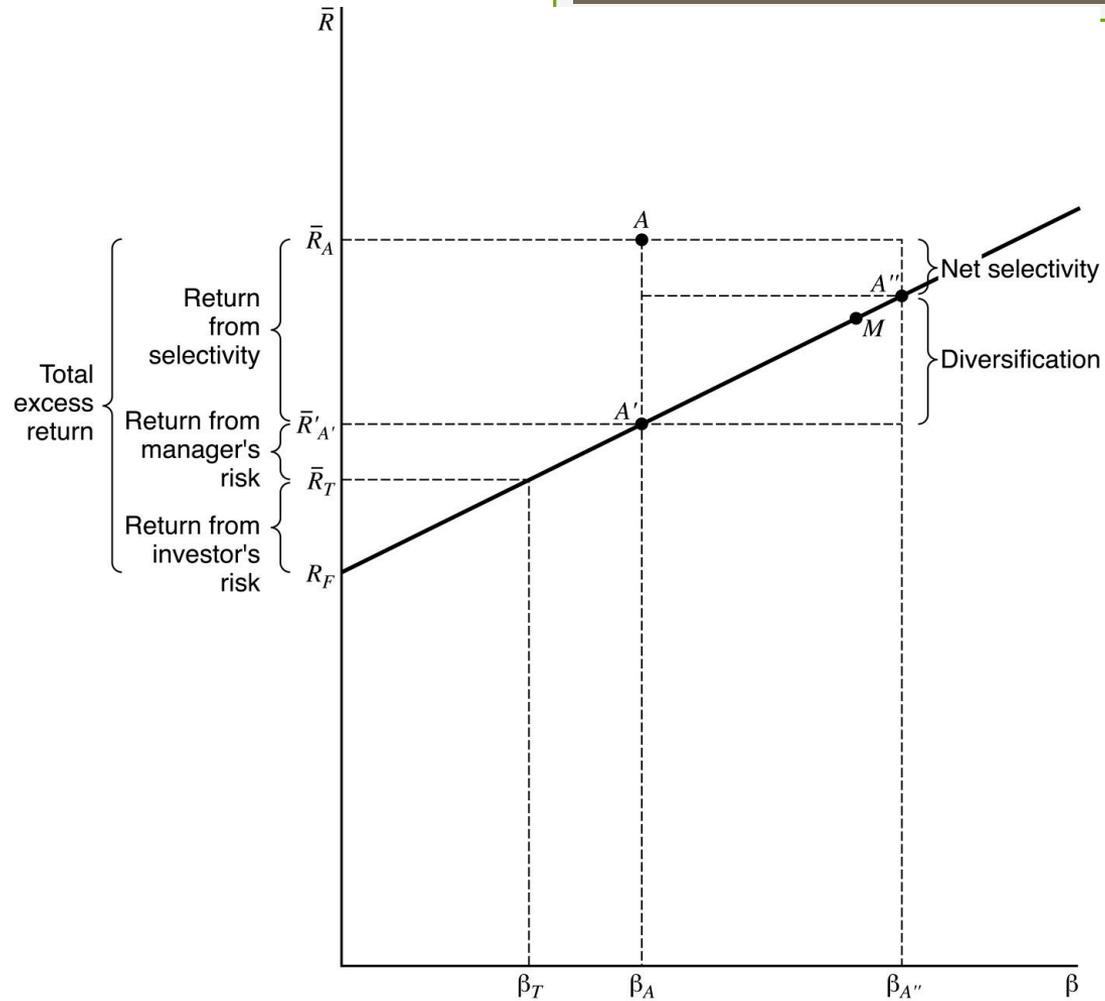
FIGURE 24-9 Decomposition of performance

Índice de Jensen (α)

$$\text{Dif. Rend.} = \alpha = R_p - \overline{R}_p = R_p - \left[R_F + \beta(\overline{R}_m - R_F) \right]$$
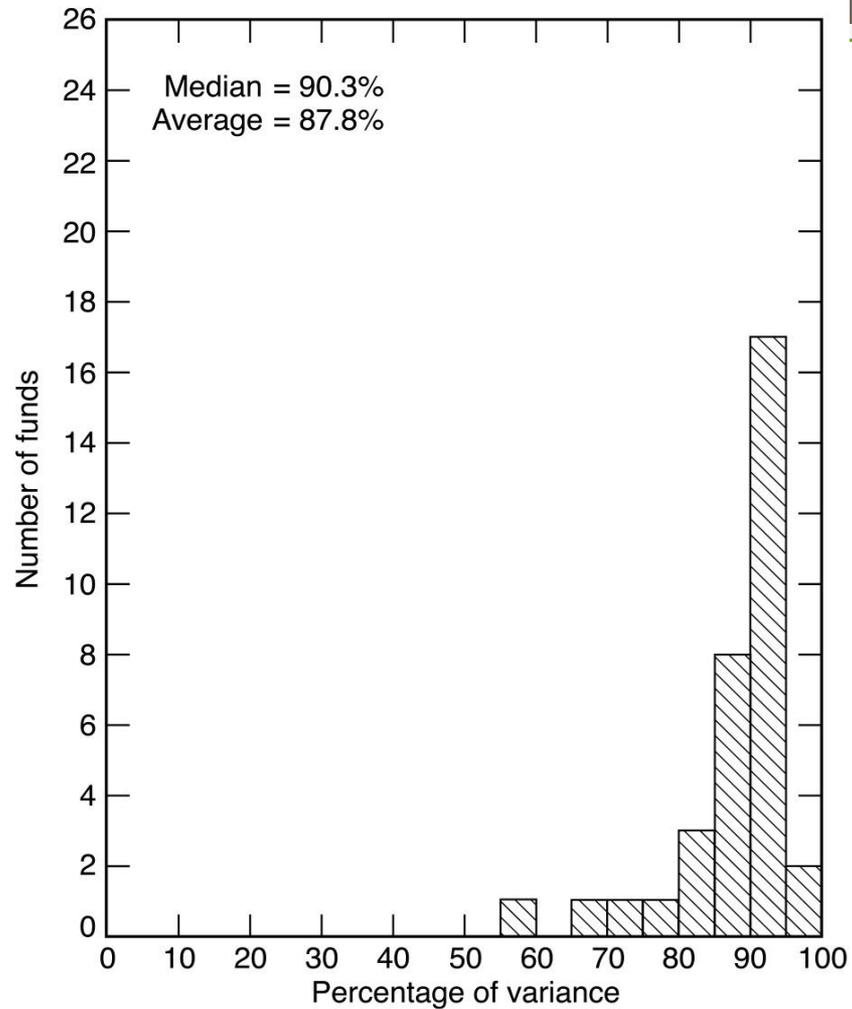
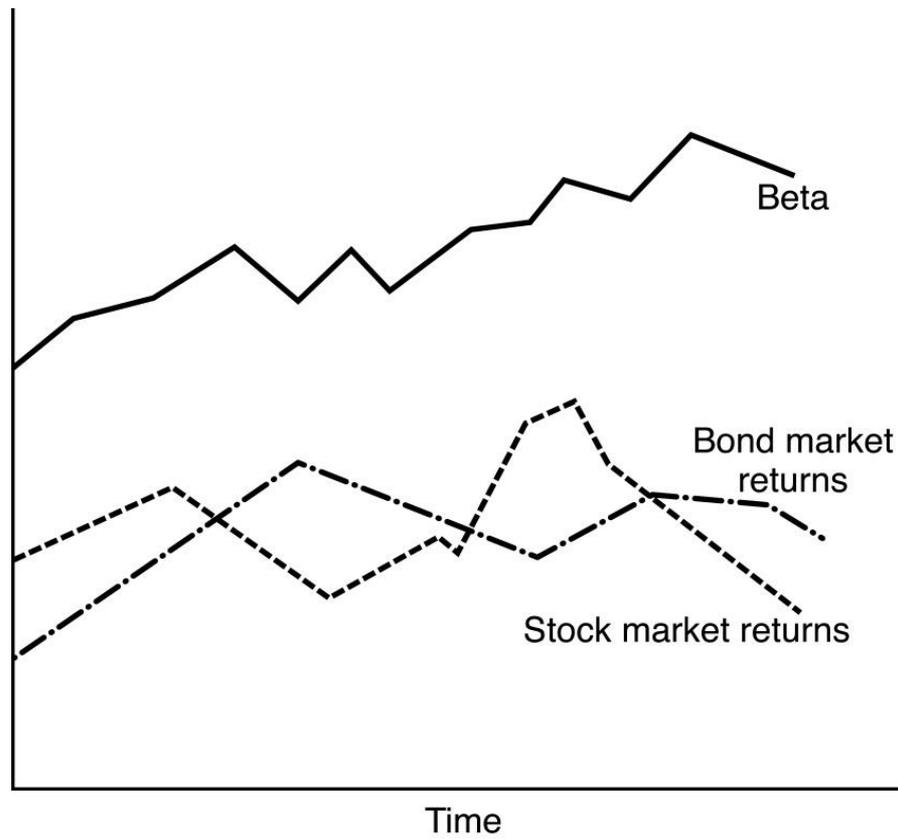**FIGURE 24-10** Percentage of market risk in fund portfolios.
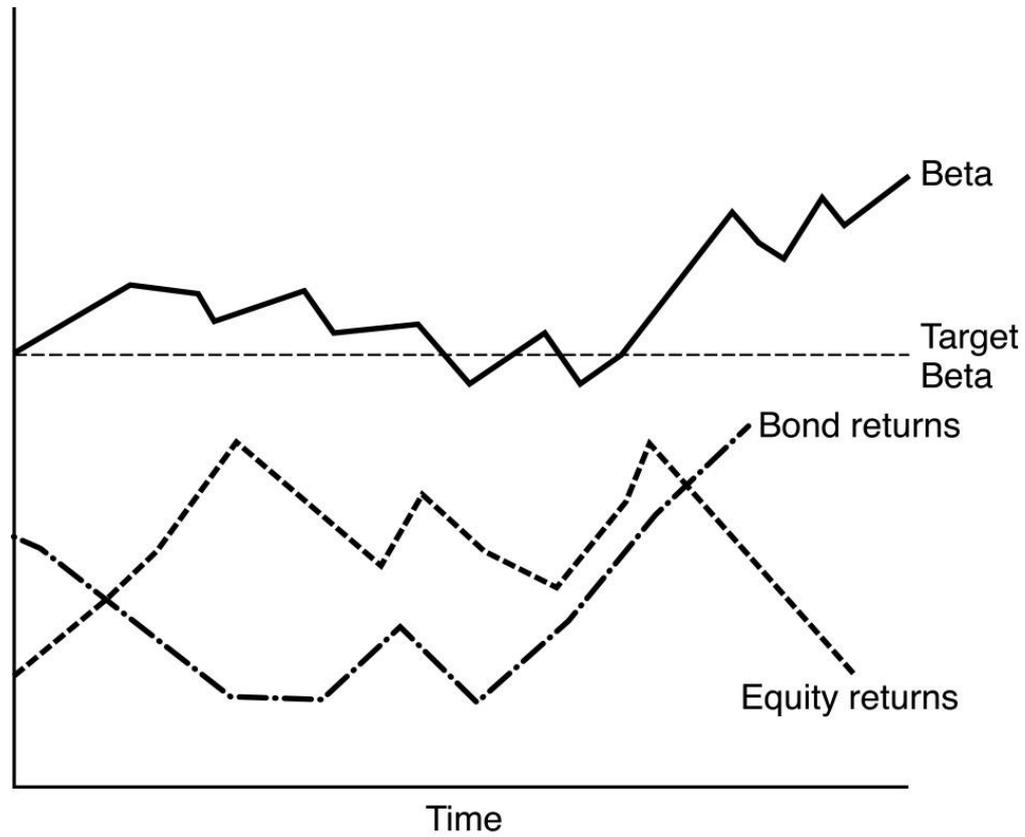
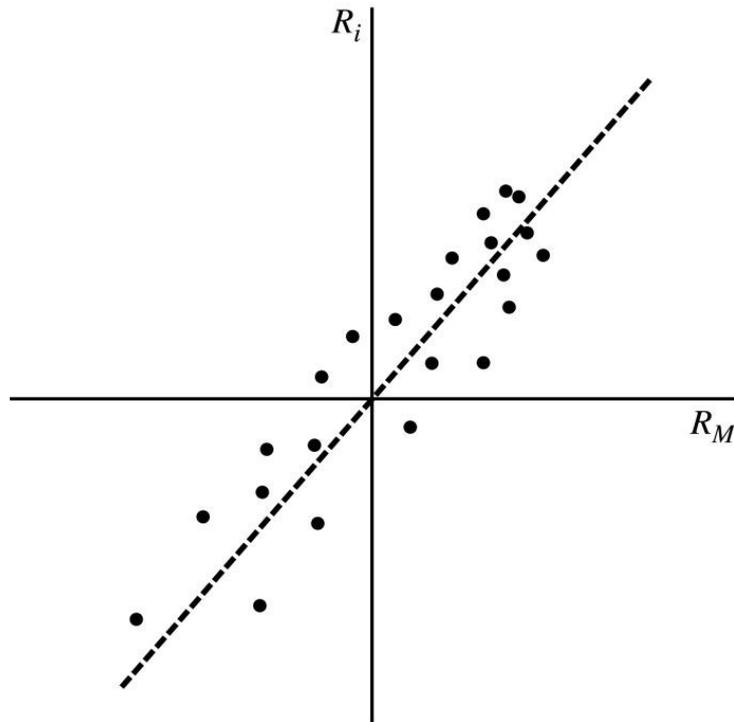**FIGURE 24-11** Beta and security returns.

FIGURE 24-12 Measuring timing.
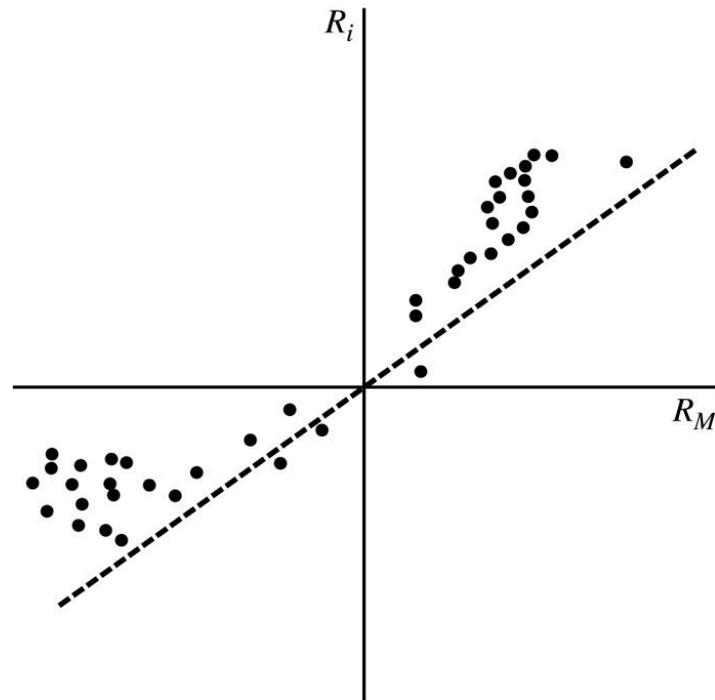
FIGURE 24-13 Returns for manager without timing.

FIGURE 24-14 Returns for manager with timing.

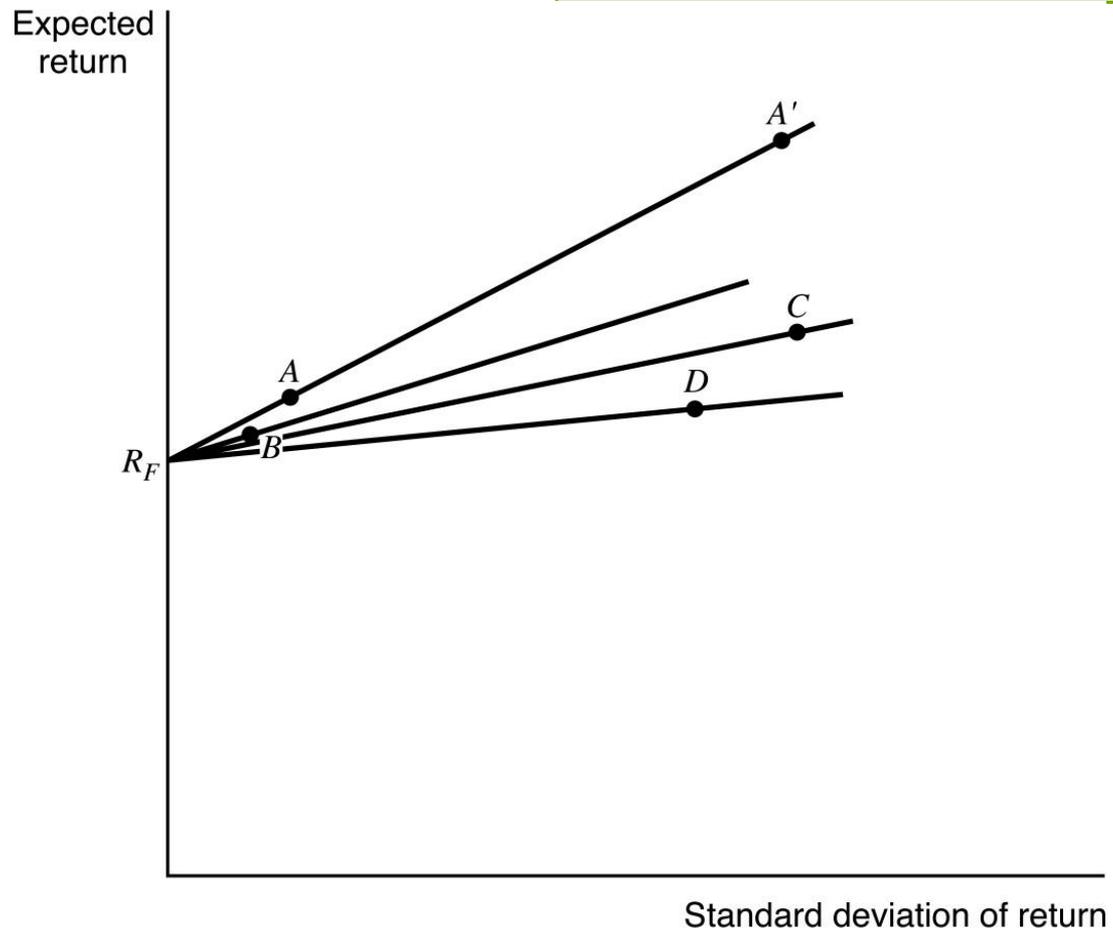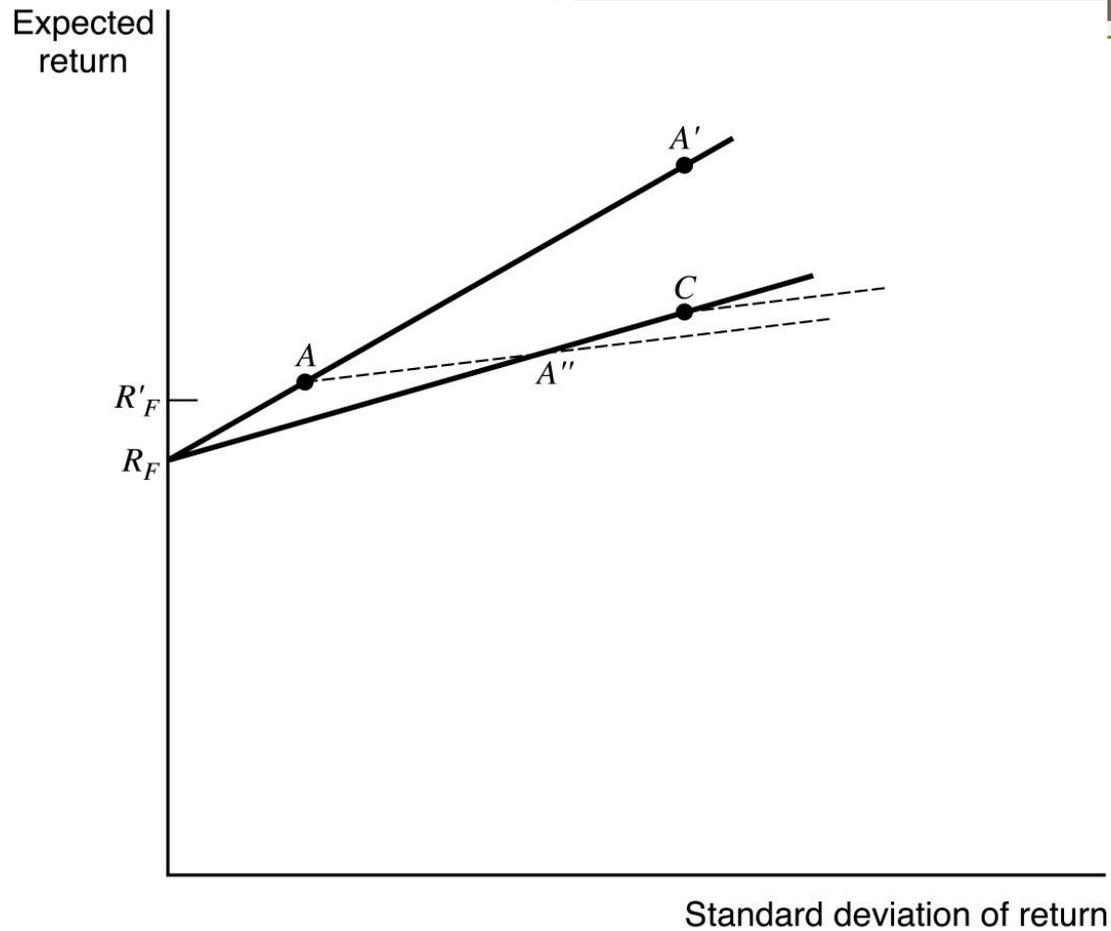**FIGURE 24-15** Combinations of risk and return.

FIGURE 24-16 Combinations of risk and return with differential lending and borrowing.
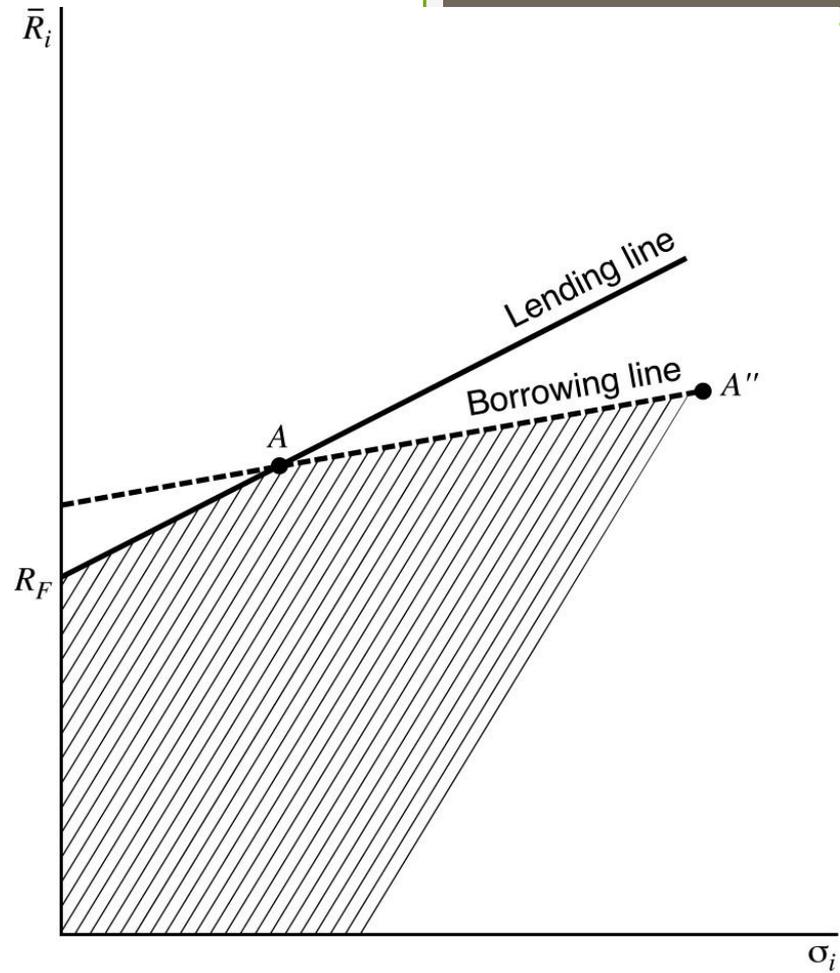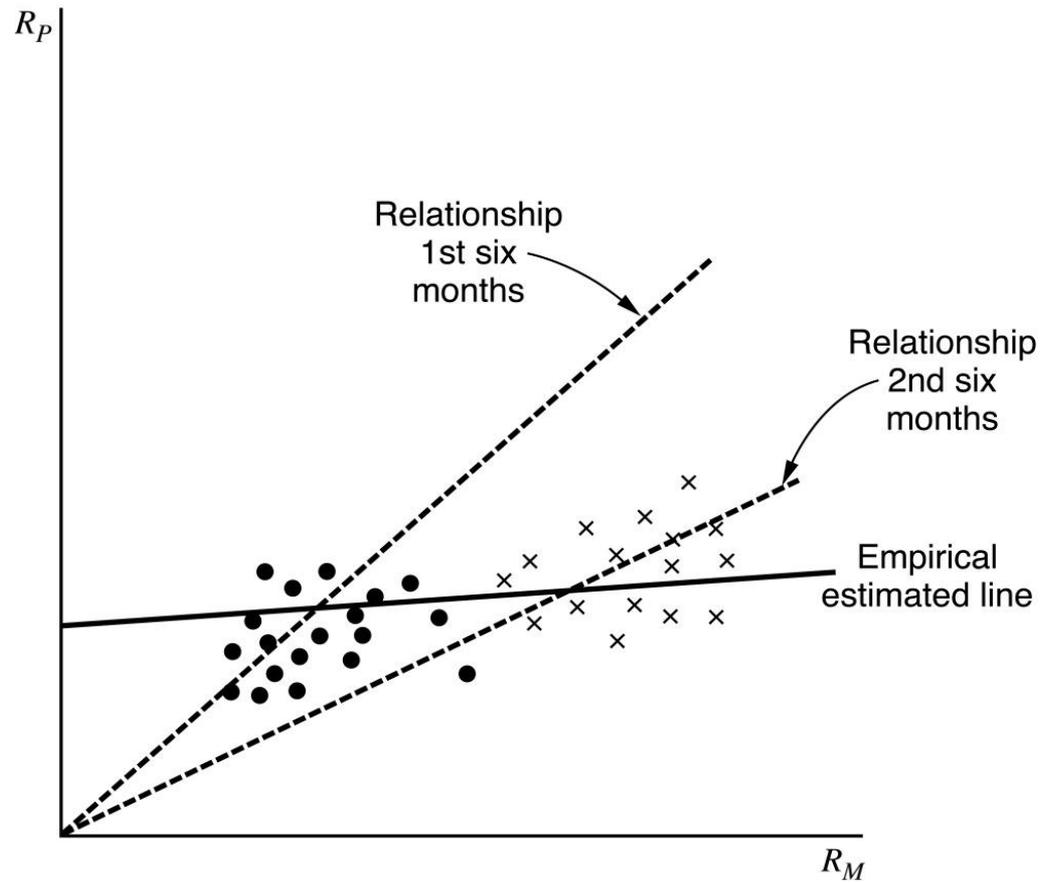
FIGURE 24-17 Regions of dominance.

FIGURE 24-18 Returns with changing Beta.

Common Influences	a Sensitivity of Manager's Portfolio b_{xj}	b Sensitivity of Market Portfolio $b_{S\&Pj}$	c Differential Sensitivity $c = a - b$	d Expected Return on Influence λ	e Unexpected Return on Influence l_j	f Differential *Expected* Return $f = c \times d$	g Differential *Unexpected* Return $g = c \times e$
Inflation	−0.5	−0.37	−0.13	−4.32	0.7	0.512	−0.091
Sales Growth	2.75	1.71	1.04	1.49	0.5	1.550	0.520
Oil Prices	−1.00	0.0	−1.00	0.00	0.4	0.000	−0.400
Market	1.30	1.0	0.30	3.96	1.0	1.188	0.300
						3.300	0.329

Table 24-10 Effect of Different Sensitivities of Performance

Return on Benchmark	
a. Expected	8.103
b. From Factors Deviating from Mean	1.591
Return from Different Sensitivities (b)	
a. Expected	3.300
b. From Factors Deviating from Mean	0.329
Return from Security Selection	1.197
Total Return on Fund	14.52

Table 24-11 Decomposition of Performance Using APT
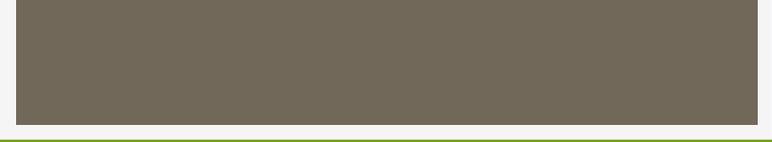
Fund	Number	α
Load	90	-1.55
No-load	19	-0.84
Switch	33	-2.17

Source: From Elton, Gruber, Das, and Hlavka [25].

Table 24-12 Performance of Load and No-Load Funds

Group	Average Turnover	α
High	$72\% < T < 162\%$	-2.21
2	$51\% < T < 72\%$	-1.87
3	$34\% < T < 51\%$	-2.17
4	$22\% < T < 34\%$	-1.11
Low	$T < 22\%$	-0.58

Source: From Elton, Gruber, Das, and Hlavka [25].

Table 24-13 Turnover and Alpha

Group	Average Expenses	α
High	$0.912 < E < 2.020$	-3.87
2	$0.753 < E < 0.912$	-1.68
3	$0.680 < E < 0.753$	-0.69
4	$0.590 < E < 0.680$	-1.19
Low	$E < 0.590$	-0.59

Source: From Elton, Gruber, Das, and Hlavka [25].

Table 24-14 Effect of Average Expenses on a

Risk Class (Beta Coefficient)	Number in Sample				Mean Return			
	$10 to $50[a]	$50 to $100	$100 to $500	$500 and over	$10 to $50[a]	$50 to $100	$100 to $500	$500 and over
Low Risk ($\beta = 0.5-0.7$)	8	5	14	1	0.088	0.093	0.092	0.105
Medium Risk ($\beta = 0.7-0.9$)	11	12	18	12	0.101	0.111	0.105	0.110
High Risk ($\beta = 0.9-1.1$)	3	3	13	3	0.125	0.153	0.131	0.146

[a]Asset size in millions of dollars as of the end of 1967.

Source: From Friend, Blume, and Crockett [30].

Table 24-15 Comparison of Investment Performance of Mutual Funds in Different Asset Size Groups (January 1960–June 1968)

	Investment Objective				
Volatility Range	Capital Gain	Growth	Growth Income	Income	Total
0−0.4	0	0	0	3	3
0.4−0.8	0	5	18	12	35
0.8−1.0	2	7	33	2	44
1.0−1.2	5	21	4	0	30
1.2+	8	5	0	0	13
Total	15	38	55	17	125

Source: SEC study [74].

Table 24-16 Relationship between Stated Investment Objectives and Mutual Fund Volatility, 125 Funds

Risk Class (Beta Coefficient)	Number in Sample				Mean Return			
	$10 to $50[a]	$50 to $100	$100 to $500	$500 and over	$10 to $50[a]	$50 to $100	$100 to $500	$500 and over
Low Risk ($\beta = 0.5-0.7$)	8	5	14	1	0.088	0.093	0.092	0.105
Medium Risk ($\beta = 0.7-0.9$)	11	12	18	12	0.101	0.111	0.105	0.110
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[a]Asset size in millions of dollars as of the end of 1967.
Source: From Friend, Blume, and Crockett [30].

Table 24-17 Performance of Bond Funds

- Teoria da Eficiência do Mercado de Capitais

A teoria da eficiência do mercado de capitais é um tema dominante na literatura económica.

- Na definição de Fama, um mercado eficiente seria aquele onde toda a informação se encontra refletida nos preços.

No entanto, Stiglitz and Grossman (1980) demonstraram que um mercado eficiente em termos de informação seria impossível porque a obtenção de informação tem custos, e como tal, os investidores precisam de ganhos para justificar esses custos.

- Deste modo, Elton et al sugerem uma definição adaptada a este problema,

- "os preços refetem a informação até ao ponto em que o custo marginal de obter informação e de transaccionar em bolsa não excede o benefício marginal".

- Para além disso, a grande maioria dos testes classificados como de eficiência de mercado não estuda de facto se os preços refletem ou não toda a informçaõ disponível.

- Tendem a estudar a velocidade com que a informção é incorporada nos preços.

- Isto é, a velocidade com que a informação é incorporada nos preços numa óptica da eficiência do mercado de capitais.

- Porque numa perspectiva alternativa, os estudos podem estar a fazer análise da reação dos preços a nova informação.

- Tal como inicialmente formulada por Fama nos anos 70, existiam 3 formas de eficiência do mercado de capitais.
- A) Eficiência fraca.
- B) Eficiência semi-forte.
- C) Eficiência forte.

- A) Eficiência fraca.

- Toda a informção contida nos preços históricos se encontra refletida no preços atuais.

- B) Eficiência semi forte:

- Toda a informação disponível publicamente encontra-se refletida nos preços dos ativos.

- C) Eficiência forte.

- Toda a informação publica e privada encontra-se refletida nos preços.

- Em 1988, Fama alterou a tipologia quanto às formas de eficiência:
- 1) testes de previsibilidade dos retornos.
- 2) estudos de eventos e anúncios públicos.
- 3) testes de informação privada.

- De notar de novo que estes testes estão sobretudo preocupados com a rapidez com que os preços vão reagir à nova informação.

- O que se irá refletir ou não, em súbidas e descidas de preço.

Background

- Comparação entre período t e período t+1.

- "retorno normal esperado".

- "Fair game".

- Random walk.

- Testes da previsibilidade do retorno.

- Padrões temporais nos retornos.

- Estudos sobre distribuição dos retornos ao longo da semana.

  - Monday effect (negativo); (Gibbons and Hesse, 1981; Harris, 1986; Keim 1989).