

B12. MUTUAL FUNDS

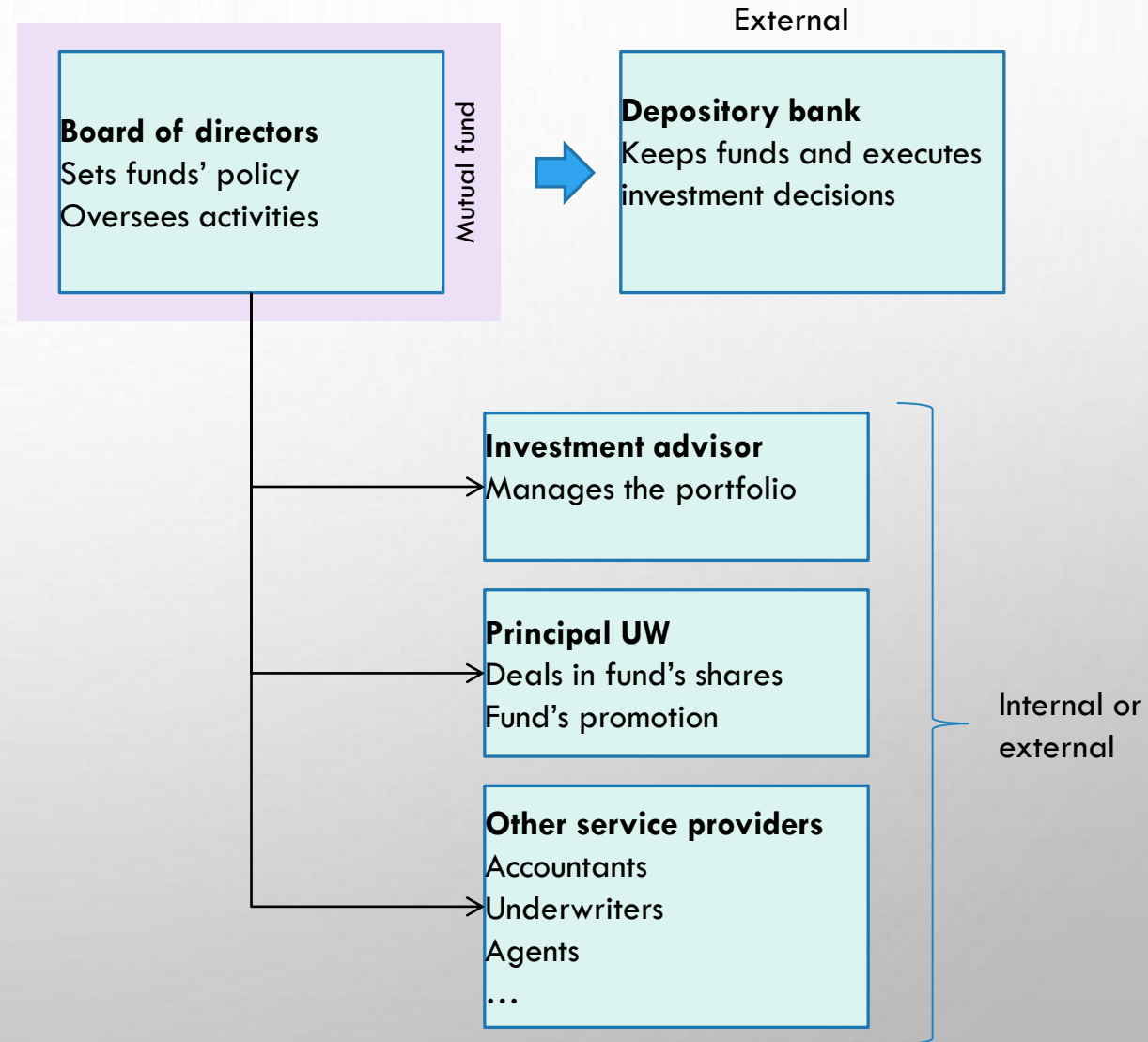


- WHY MUTUAL FUNDS? HOW? VARIATIONS?
- PERFORMANCE MEASURES
- COSTS

WHY MUTUAL FUNDS

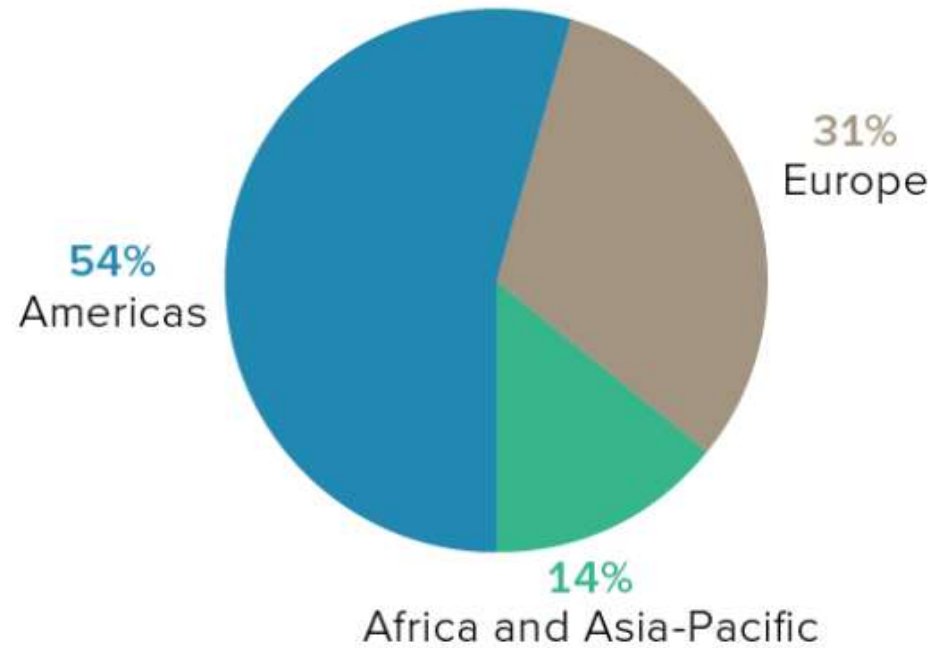
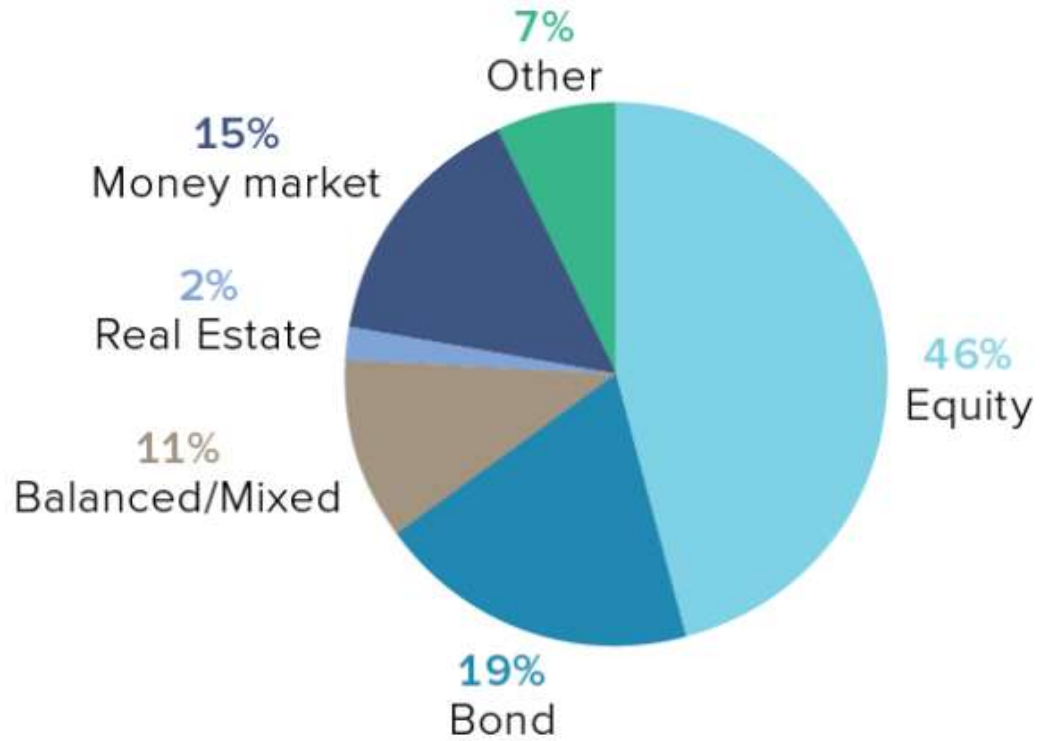
Impressive **exponential growth** in few decades linked with their competitive advantage (2023: 130.000+ funds, 70+ trn USD in AUM):

- **liquidity** of investments: holdings represented by shares, mostly aiming at capital gains (several “distributing” funds exist)
- **access** to securities sold at large-denominations
- **diversification** also for small amounts
- **affordable** fees: economies of scale on transaction costs
- provision of **expertise**
- cheap and quick **transferability** of funds
- multidimensional **specialization**
- simple **organizational structures**



By type of fund, 2023:Q4

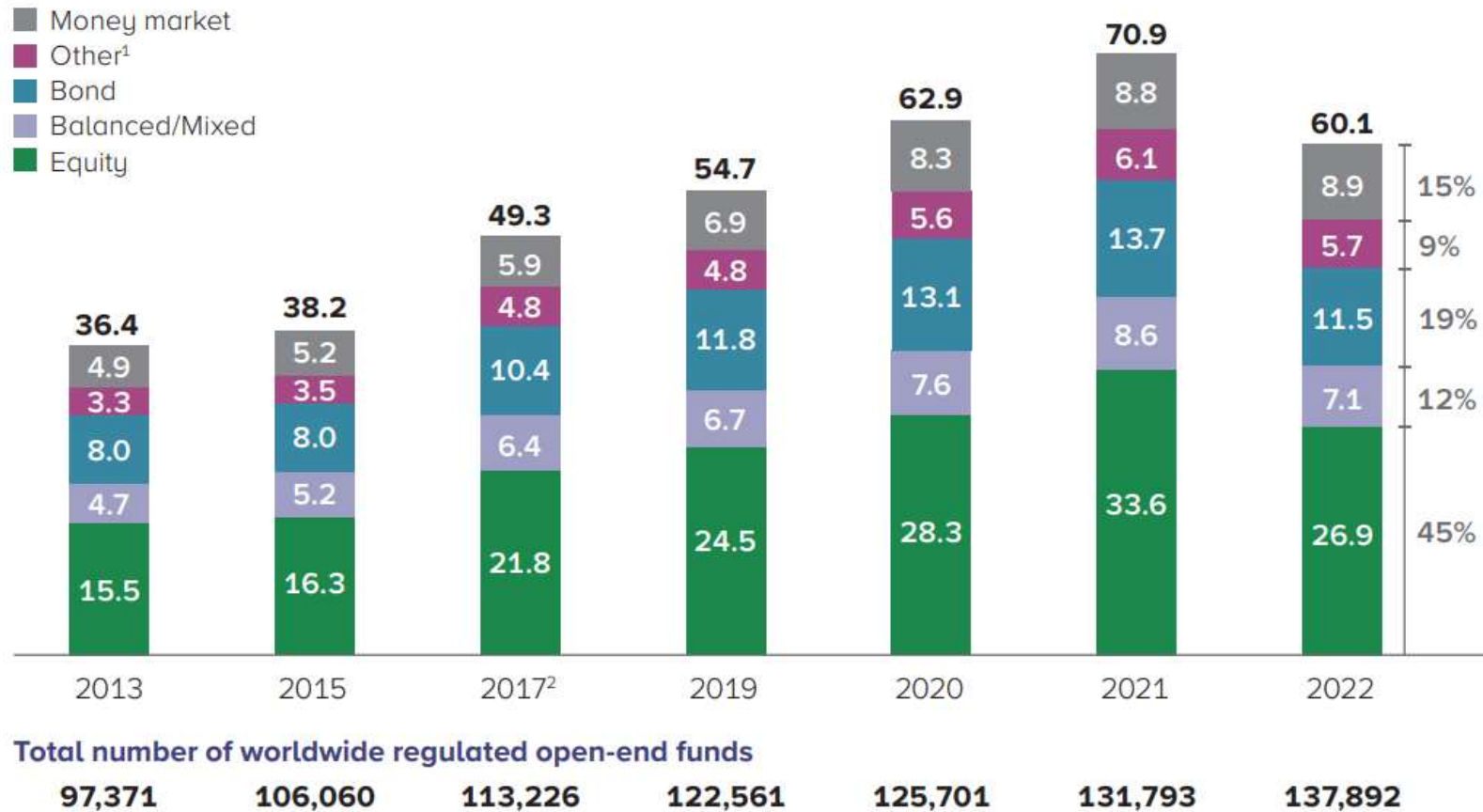
By region, 2023:Q4



EXAMPLES

Total Net Assets of Worldwide Regulated Open-End Funds Declined to \$60.1 Trillion in 2022

Trillions of US dollars by type of fund, year-end

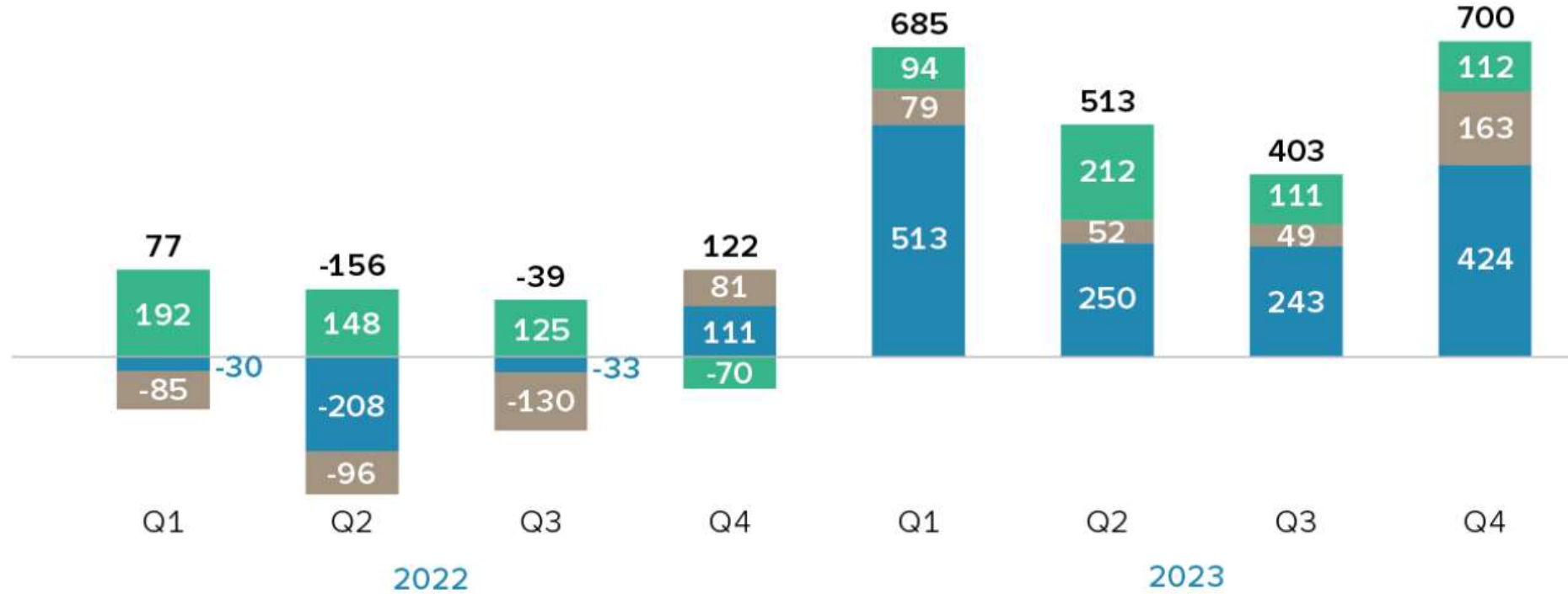


EXAMPLES

Worldwide Net Sales of Regulated Open-End Funds by Region

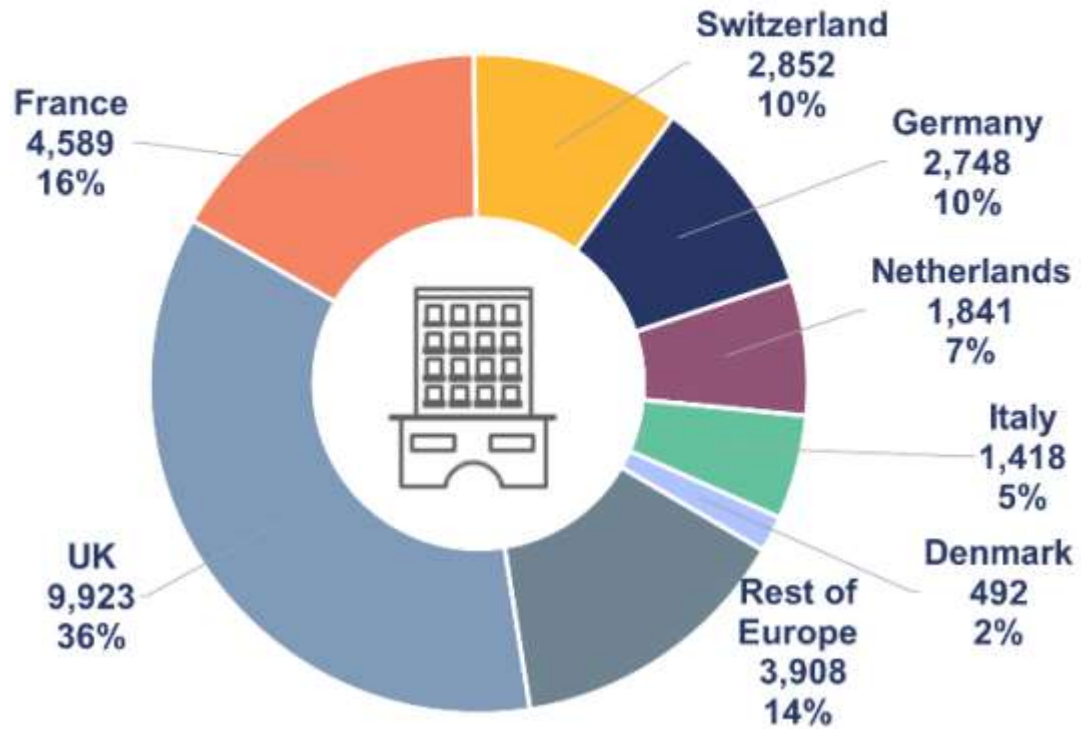
Billions of US dollars

- Africa and Asia-Pacific
- Europe
- Americas

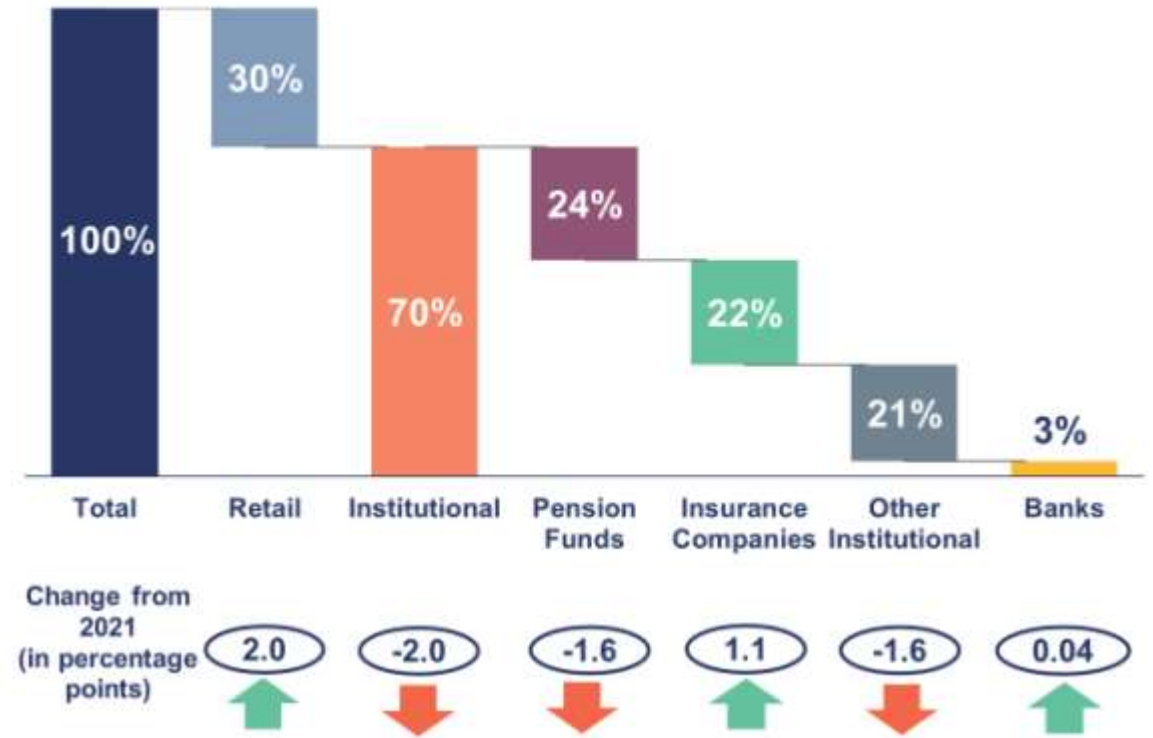


EXAMPLES

AuM in European countries at the end of 2022
(EUR billions, percent of total)



Breakdown of AuM by clients at the end of 2022
(Percent of total and change in pp. from 2021)



EXAMPLES

PERFORMANCE

Main tool for evaluating funds' performance:

- $$\frac{\text{MARKET VALUE OF ASSETS} - \text{LIABILITIES}}{\text{NUMBER OF SHARES}}$$
- represents the current purchase or selling price
- tracks the *generic performance* over time



However other measures exist, since we are also interested in:

- Funds' risks
- Performance of an actual investor
- Funds performance relative to a benchmark
- ...

PERFORMANCE

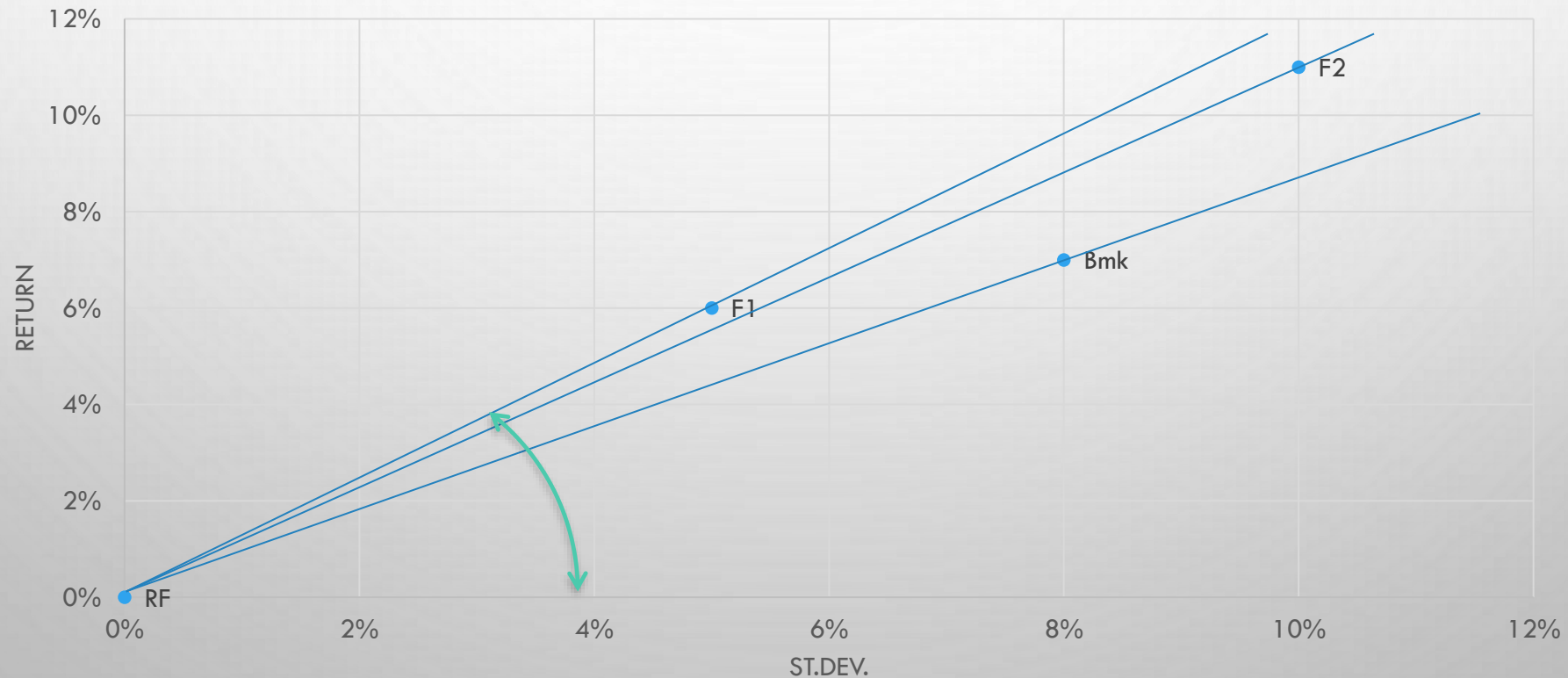
- Sharpe's ratio $SR = \frac{r_P - r_f}{\sigma_P}$
 - Modigliani's ratio $M = \frac{r_P - r_f}{\sigma_P} \times \sigma_M$
 - Treynor's ratio $Treynor = \frac{r_P - r_f}{\beta_P}$
 - Sortino's ratio $Sortino = \frac{r_P - r_f}{DSR}$
 - MWRR $MWRR = R(t_0, T) = \frac{V(T) - V(t_0) - F}{\bar{V}(t_0, T)}$
 - Tracking error $TE = \sigma_{r_p - r_B}$
- Different «risk» measures: absolute and relative st.dev., beta (relative market volatility), downside risk (vs minimum acceptable return)
- Actual performance based on individual choices: net in/outflows and average invested amounts
- St. dev. of differences in returns from benchmark

PERFORMANCE

SHARPE RATIO (similar to Traynor)

HP:

- FUND 1: return 6%, st.dev. 5% SR= 1,2
- FUND 2: return 11%, st.dev. 10% SR= 1,1
- *Benchmark*: return 7%, st.dev. 8% SR= 0,88
- *Risk free*: return 0%, st.dev. 0%

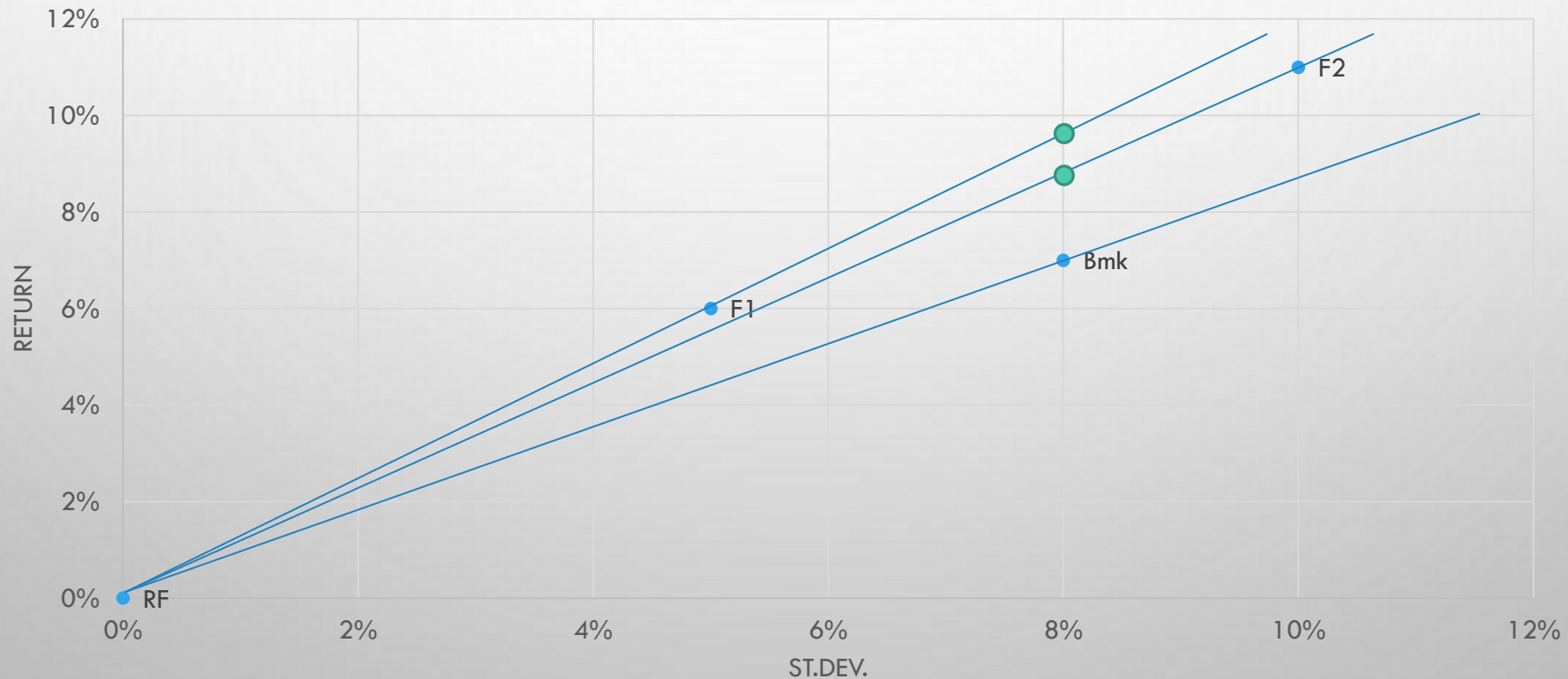


STRUTTURA DEL MERCATO

MODIGLIANI RAP

HP:

- FUND 1: return 6%, st.dev. 5% RAP = 0,096
- FUND 2: return 11%, st.dev. 10% RAP = 0,088
- *Benchmark*: return 7%, st.dev. 8%
- *Risk free*: return 0%, st.dev. 0%



TYPES

Based on liquidity:

- **close-end:**

- mutual funds' shares are fixed in number at the initial offering
- withdrawals and new investments are (typically) not possible: only finding somebody willing to exit/enter
- concentration in few specific asset classes (f.i. real estate, art, startups, ...)

- **open-end:**

- largest group
- new investors can get new shares, buy-back/liquidation option
- the fund has a variable number of shares

Based on target:

- **equity** funds: aiming at current income (dividends), capital gains or a combination (i.e. total return funds)
- **bond** funds: government, corporate, currency, maturity, ...
- **money market** funds: short-term, versatile and cheap
- **hybrid** funds: stocks and bonds together
- **index** funds: passive management (f.i. ETFs, ETCs, ...)
- **hedge** funds: seeking pricing anomalies from predicted paths, often unregulated and/or offshore, longer term to cope with higher risk, frequent use of leverage



COSTS

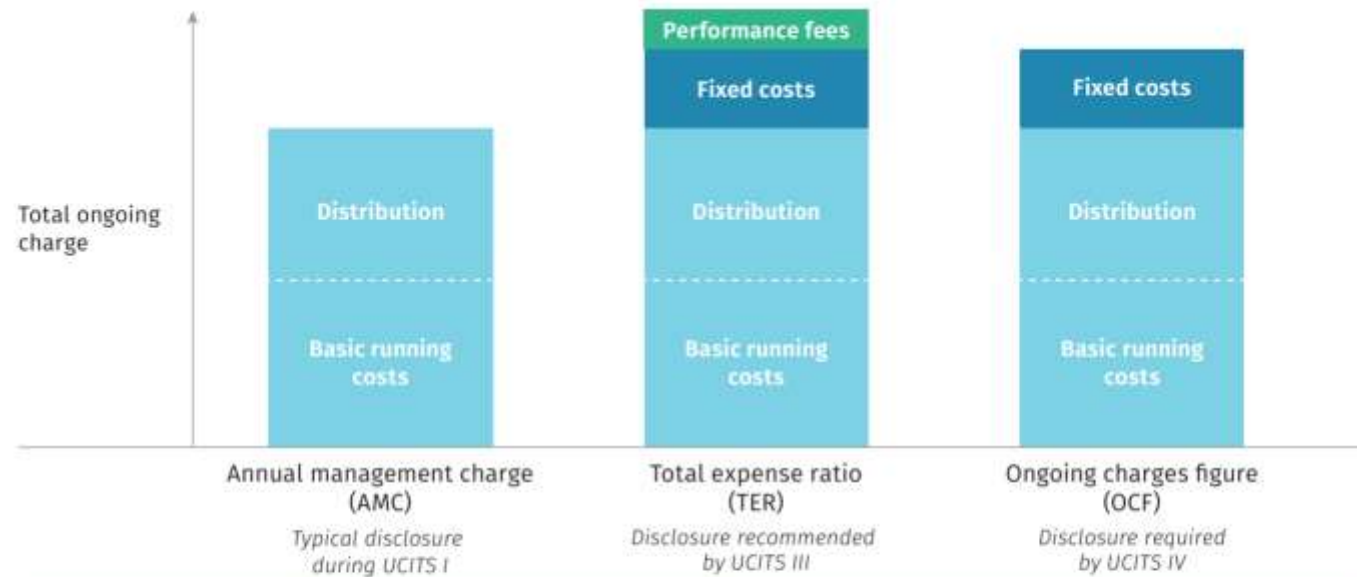
Fee structure:

- **load funds:** commissions are paid to intermediaries up-front reducing the investment
- **deferred load funds:** fees are charged when leaving the fund, usually with declining % (redemption fee)
- **no-load funds:** sold directly with no entry/exit charges (but with ongoing/performance fees)

Several other fees:

- costs of **switching**
- **administrative** fees
- **income sharing**
- ...

Elements of Ongoing Charges Incurred for Investing in UCITS



Descriptions of costs

Basic running costs. Fees that include staff salaries, research costs, and other similar essential operating costs.

Distribution. Fees paid by the fund to the distributor for its services, sometimes referred to as *trailer fees* or *retrocessions*. Some EU countries prohibit such fees for new/existing subscriptions.

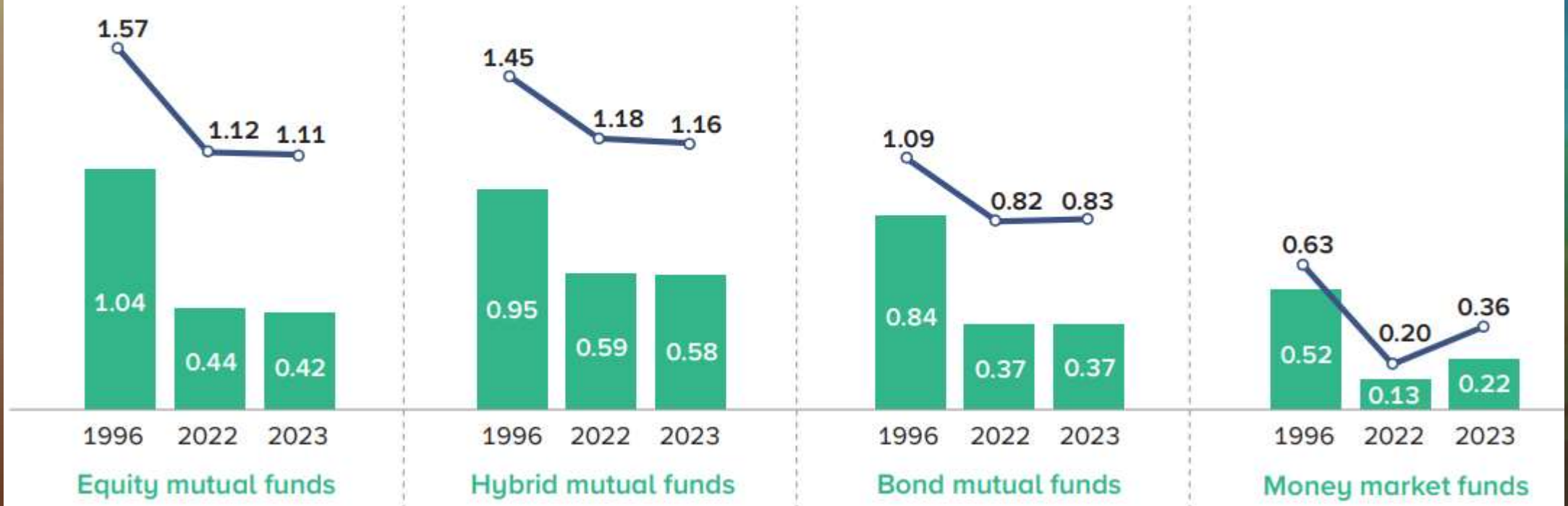
Fixed costs. Fees relatively fixed in euro terms—includes fees such as administrator fees, depositary fees, audit fees, transfer agent fees, legal fees, and regulatory fees.

Performance fees. Fees related to fund performance that are explicitly *included* in the TER, but explicitly *excluded* from the OCF.

Average Expense Ratios Incurred by Mutual Fund Investors Have Declined Substantially Since 1996

Percent

○ Simple average
■ Asset-weighted average



Note: For additional data, see Figure S1 in the statistical appendix.

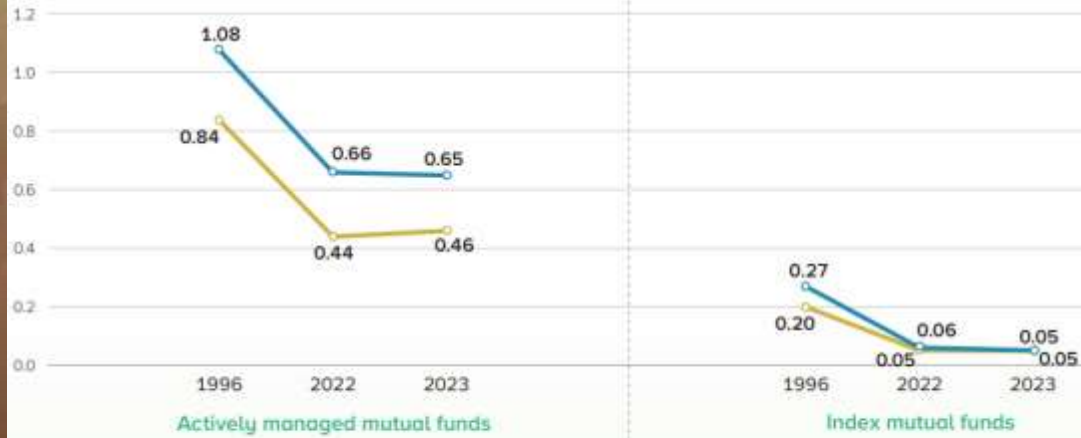
Sources: Investment Company Institute, Lipper, and Morningstar

EXAMPLES

Average Expense Ratios of Both Actively Managed and Index Mutual Funds Have Fallen

Percent

Equity mutual funds
Bond mutual funds



Note: Expense ratios are measured as asset-weighted averages. For additional data, see Figure S3 in the statistical appendix.
Sources: Investment Company Institute, Lipper, and Morningstar

Average Expense Ratios of Both Actively Managed and Index ETFs Have Fallen

Percent

Equity ETFs
Bond ETFs



Note: Expense ratios are measured as asset-weighted averages. Data exclude ETFs not registered under the Investment Company Act of 1940. For additional data on ETF expense ratios, see Figures S4, S5, and S6 in the statistical appendix.
Sources: Investment Company Institute, Lipper, and Morningstar

EXAMPLES

Active Funds' Success Rate by Category (%)

Source: Morningstar. Data and calculations as of June 30, 2023. *Green/red shading indicates that active funds in this fee quintile had above/below-average success rates

Category	1-Year	3-Year	5-Year	10-Year	15-Year	20-Year	10-Year (Lowest Cost) *	10-Year (Highest Cost)
U.S. Large Blend	50.4	41.1	29.5	9.8	9.3	9.1	16.2	5.6
U.S. Large Value	54.2	39.7	29.5	12.0	5.5	16.1	15.0	8.5
U.S. Large Growth	54.5	32.4	30.8	10.1	2.1	4.9	16.3	6.8
U.S. Mid Blend	48.7	56.9	37.2	14.0	16.7	8.7	27.3	3.8
U.S. Mid Value	64.1	40.7	42.9	9.4	11.7	16.2	5.0	9.1
U.S. Mid Growth	56.1	36.8	63.0	46.1	27.3	—	46.3	35.7
U.S. Small Blend	74.7	57.3	43.3	28.3	19.5	23.4	45.9	27.5
U.S. Small Value	57.3	32.8	39.8	33.0	21.9	23.6	28.6	23.8
U.S. Small Growth	62.3	32.4	57.4	45.8	27.9	19.3	47.2	46.3
Foreign Large Blend	57.6	45.6	33.1	26.0	23.9	17.6	40.6	22.2
Foreign Large Value	75.0	37.5	28.7	38.3	23.7	—	47.1	25.0
Foreign Small-Mid Blend	66.7	27.6	25.8	31.8	53.8	—	40.0	40.0
World Large-Blend	44.1	36.2	24.1	10.0	11.4	—	8.3	8.3
Diversified Emerging Markets	57.1	32.1	36.5	35.2	25.6	—	45.5	27.3
Europe Stock	31.3	31.3	30.4	23.8	40.9	19.6	25.0	40.0
U.S. Real Estate	54.8	38.3	63.1	52.9	30.3	24.1	50.0	42.9
Global Real Estate	84.1	78.4	64.3	51.9	33.3	—	36.4	45.5
Intermediate Core Bond	60.0	65.8	33.9	36.7	22.0	13.1	48.1	20.0
Corporate Bond	40.0	24.5	17.3	41.5	53.6	—	33.3	44.4
High-Yield Bond	56.4	45.2	45.6	28.3	—	—	46.4	6.5

EXAMPLES

1. Two mutual funds differ for their costs: Fund 1 has a 6% upfront fee and running fees for 1%. Fund 2 has a 4% final fee and running fees for 1.2%. Assuming a return of 10%, which one performs better for the investor in 5, 10, 15 and 20 years? What if the gross return starts at 5% and grows every year by 0.5%? What if the gross return starts at 7.5%, grows every year by 0.5% until it reaches 11%, then a market shock pushes it back to -10% for 1 year, -5% for another year, and then to 5% growing again at a 0.5% pace?

$$FV_1 = (1 - ef_1) \cdot (1 + i - rf_1)^t$$

$$FV_2 = (1 + i - rf_2)^t \cdot (1 - ff_2)$$

	Fund 1	Fund 2
5 y	1.45	1.46
10 y	2.23	2.23
15 y	3.42	3.40
20 y	5.27	5.19

$$FV_1 = (1 - ef_1) \cdot \prod_{h=1}^t (1 + i_h - rf_1)$$

$$FV_2 = \prod_{h=1}^t (1 + i_h - rf_1) \cdot (1 - ff_2)$$

	Fund 1 A	Fund 2 A	Fund 1 B	Fund 2 B
5 y	1.20	1.23	1.35	1.38
10 y	1.72	1.76	1.48	1.51
15 y	2.77	2.83	1.89	1.93
20 y	5.00	5.10	2.71	2.77

EXAMPLES