# MUTUAL FUNDS

A.Y. 2021/2022
Prof. Alberto Dreassi – adreassi@units.it
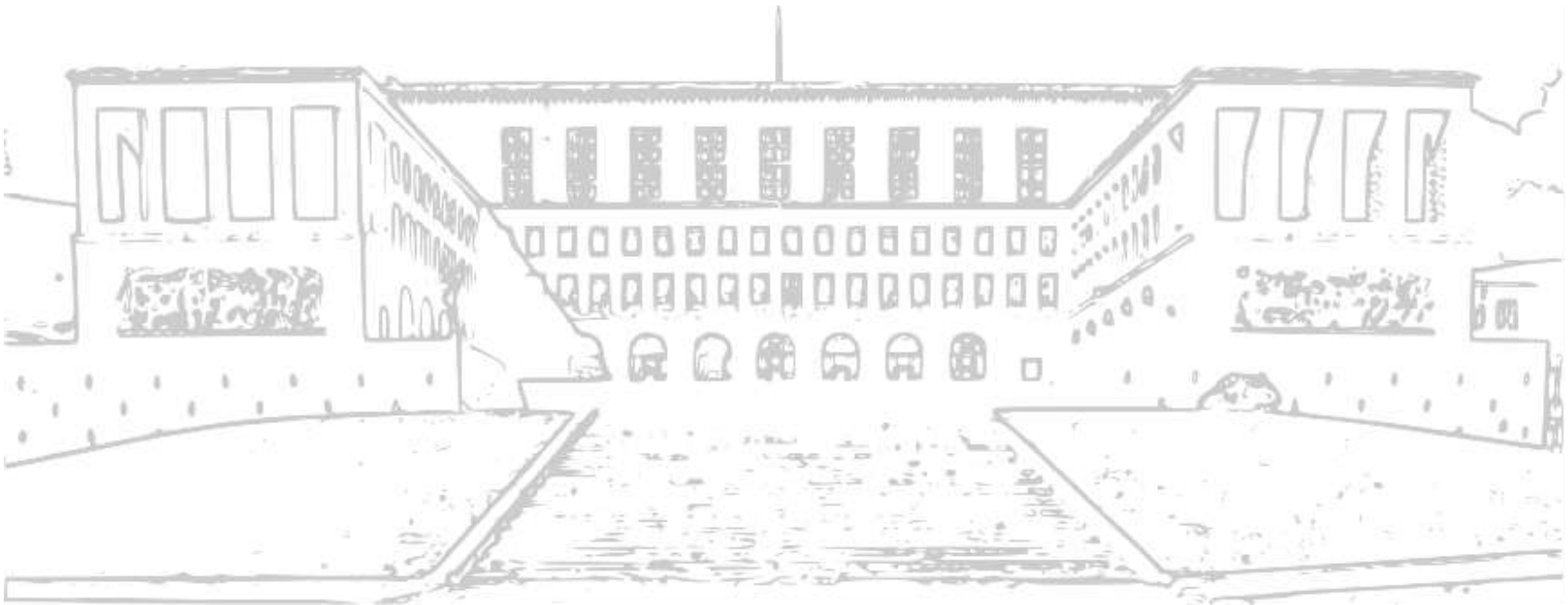
- Rationale of mutual funds

- Performance measures: NAV
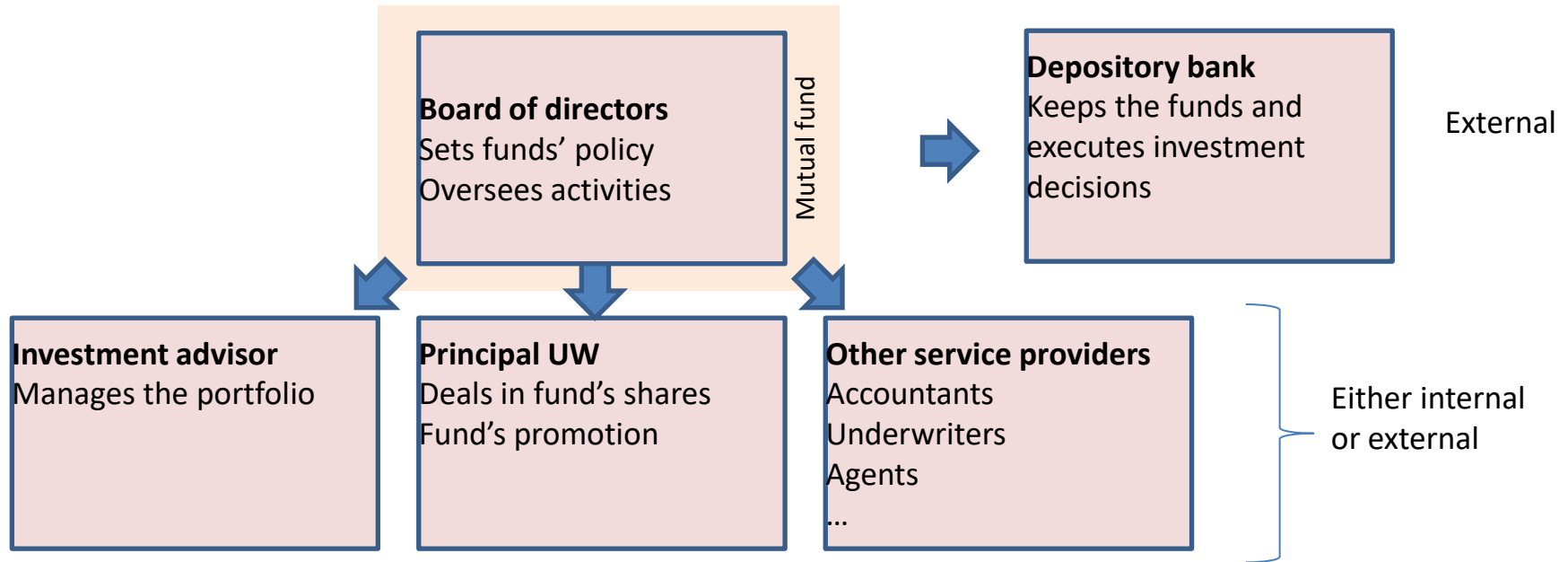
- Types of mutual funds

# WHY MUTUAL FUNDS?

Impressive **exponential growth** in the last decades closely linked with their competitive advantage:

- **liquidity** of investments

- **access** to securities sold at large-denominations

- **diversification** also for small invested capitals

- **affordable** fees Vs huge transaction costs

- provision of **expertise** on a continual basis

- cheap and quick **transferability** of funds

# HOW MUTUAL FUNDS?

## Recurring structure

**Mutual fund**

**Board of directors**
Sets funds' policy
Oversees activities

**Depository bank**
Keeps the funds and
executes investment
decisions

External

**Investment advisor**
Manages the portfolio

**Principal UW**
Deals in fund's shares
Fund's promotion

**Other service providers**
Accountants
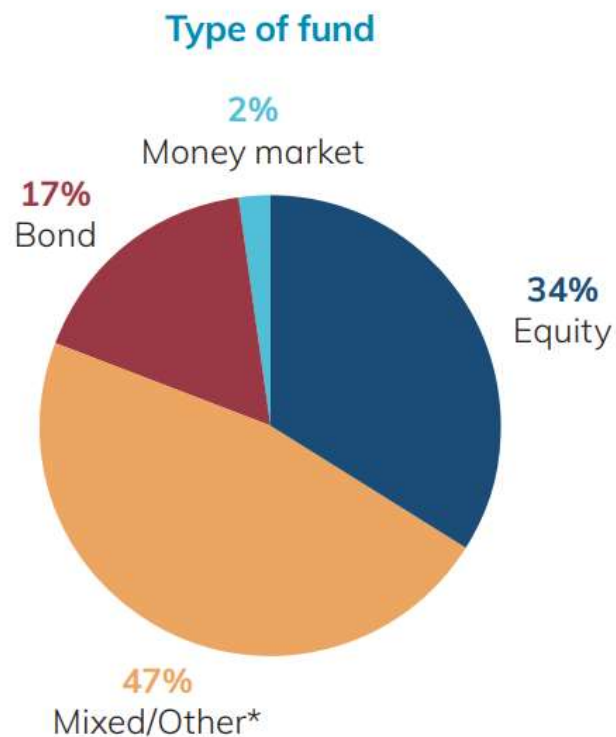Underwriters
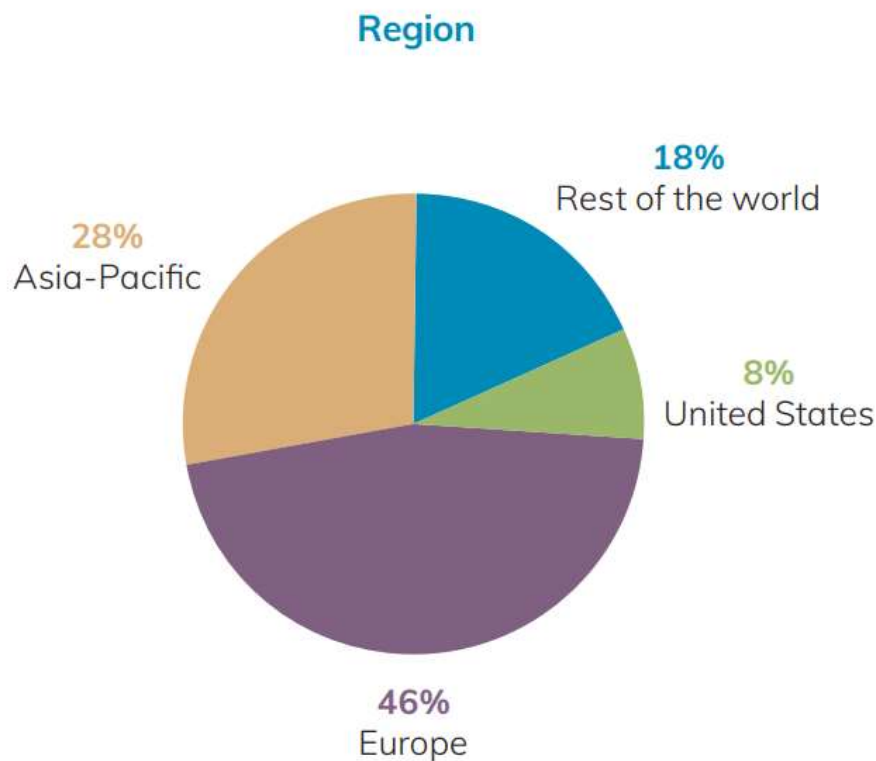Agents
…

Either internal
or external

Otherwise, like investing in stocks:

- periodic earnings (sometimes: "distributing" funds and liquidity/performance issues)
- capital gains (mostly)

**Number of Worldwide Regulated Open-End Funds**

Percentage of funds by region or type of fund, year-end 2020

Region

- 18% Rest of the world
- 28% Asia-Pacific
- 8% United States
- 46% Europe

Type of fund

- 2% Money market
- 17% Bond
- 34% Equity
- 47% Mixed/Other*
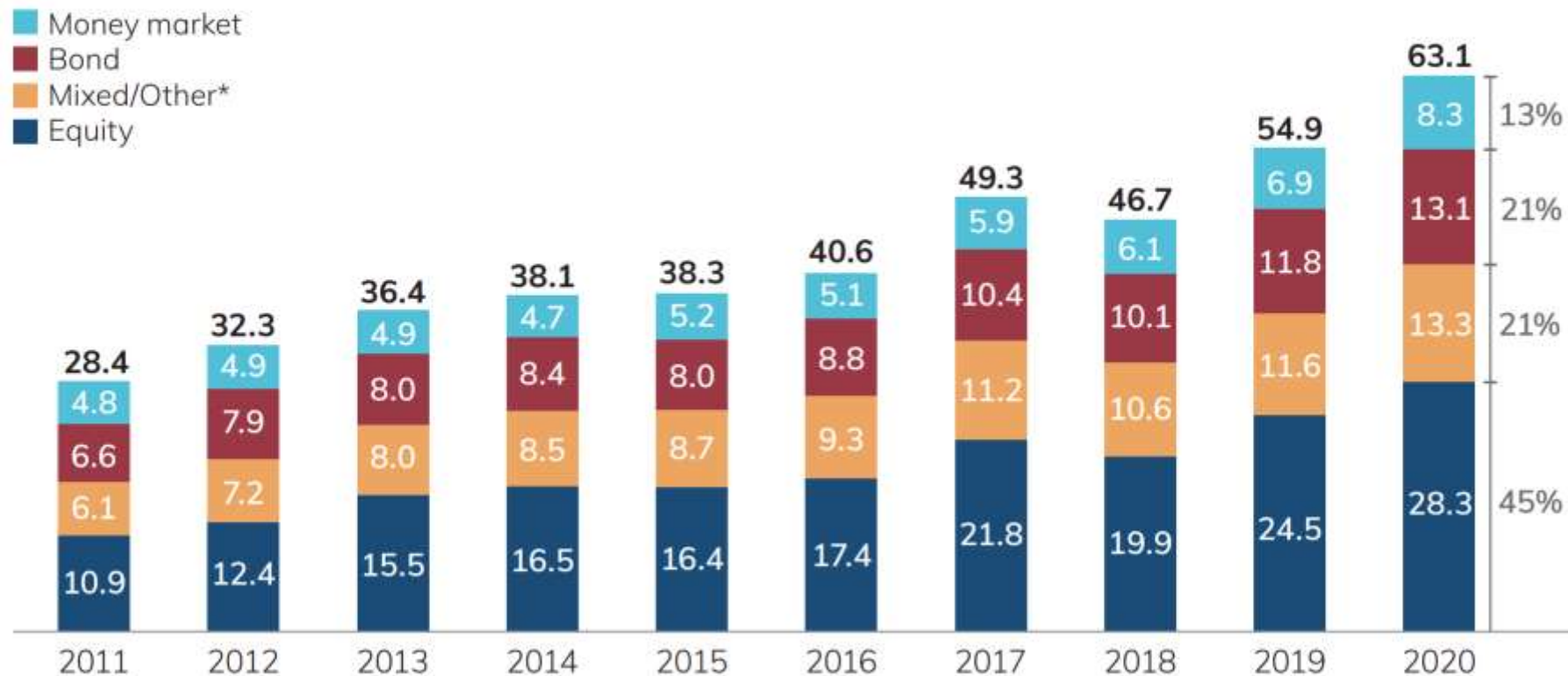
Number of worldwide regulated open-end funds: 126,457

Total Net Assets of Worldwide Regulated Open-End Funds Rose to $63.1 Trillion in 2020
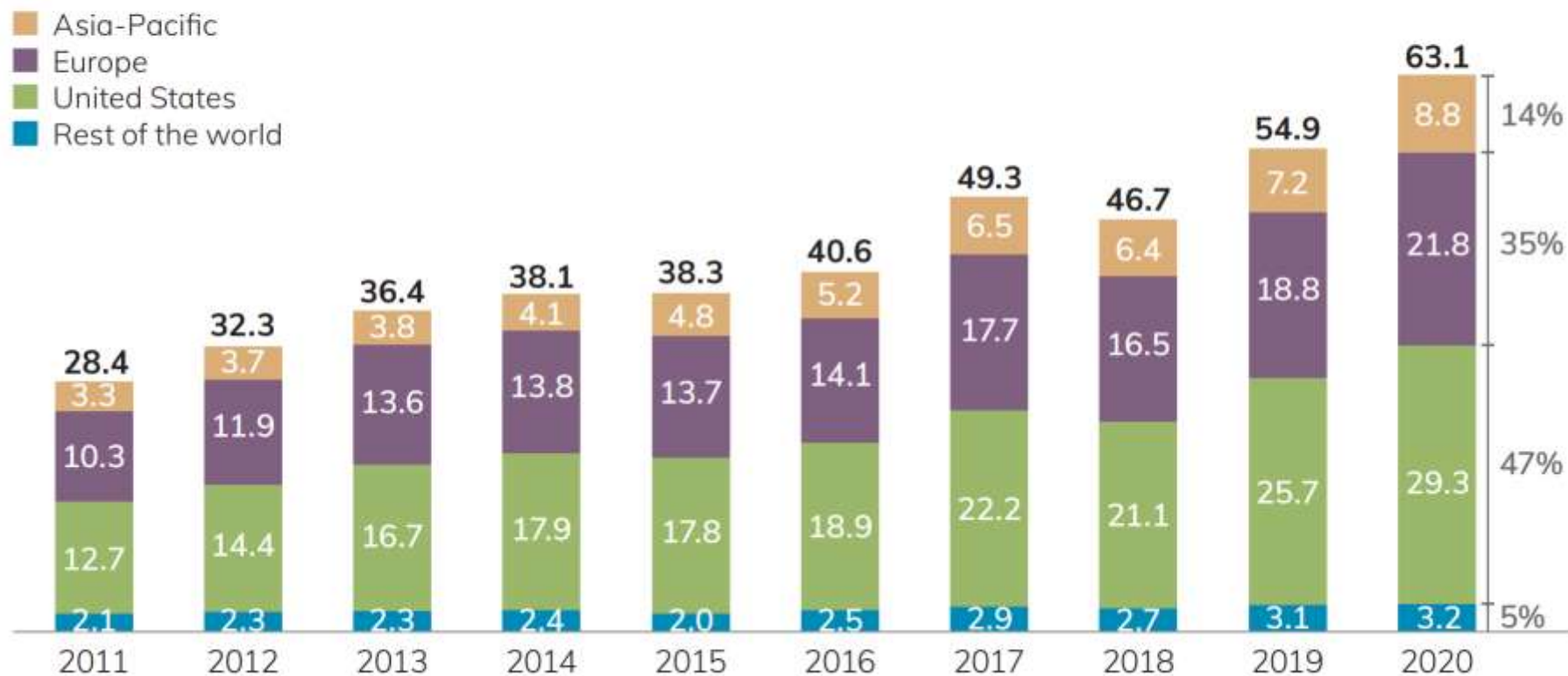
Trillions of US dollars by type of fund, year-end

Legend:
- Money market
- Bond
- Mixed/Other*
- Equity

| Year | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|---|---|---|---|
| Total | 28.4 | 32.3 | 36.4 | 38.1 | 38.3 | 40.6 | 49.3 | 46.7 | 54.9 | 63.1 |
| Money market | 4.8 | 4.9 | 4.9 | 4.7 | 5.2 | 5.1 | 5.9 | 6.1 | 6.9 | 8.3 |
| Bond | 6.6 | 7.9 | 8.0 | 8.4 | 8.0 | 8.8 | 10.4 | 10.1 | 11.8 | 13.1 |
| Mixed/Other* | 6.1 | 7.2 | 8.0 | 8.5 | 8.7 | 9.3 | 11.2 | 10.6 | 11.6 | 13.3 |
| Equity | 10.9 | 12.4 | 15.5 | 16.5 | 16.4 | 17.4 | 21.8 | 19.9 | 24.5 | 28.3 |

2020 percentages: Money market 13%, Bond 21%, Mixed/Other* 21%, Equity 45%

Total number of worldwide regulated open-end funds
91,572  93,833  97,377  101,100  106,066  110,127  112,950  118,278  122,558  126,457

6

The United States Has the Largest Share of Total Net Assets of Worldwide Regulated Open-End Funds

Trillions of US dollars by region, year-end

Legend:
- Asia-Pacific
- Europe
- United States
- Rest of the world

| Year | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|---|---|---|---|
| Total | 28.4 | 32.3 | 36.4 | 38.1 | 38.3 | 40.6 | 49.3 | 46.7 | 54.9 | 63.1 |
| Asia-Pacific | 3.3 | 3.7 | 3.8 | 4.1 | 4.8 | 5.2 | 6.5 | 6.4 | 7.2 | 8.8 |
| Europe | 10.3 | 11.9 | 13.6 | 13.8 | 13.7 | 14.1 | 17.7 | 16.5 | 18.8 | 21.8 |
| United States | 12.7 | 14.4 | 16.7 | 17.9 | 17.8 | 18.9 | 22.2 | 21.1 | 25.7 | 29.3 |
| Rest of the world | 2.1 | 2.3 | 2.3 | 2.4 | 2.0 | 2.5 | 2.9 | 2.7 | 3.1 | 3.2 |

2020 shares: 14%, 35%, 47%, 5%

7

# PERFORMANCE MEASURES

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
- Specific performance of an investor
- Funds performance relative to a benchmark market
- Funds' net performance
- …

# PERFORMANCE MEASURES

- Sharpe's ratio

$$SR = \frac{r_P - r_f}{\sigma_P}$$

- Modigliani's ratio

$$M = \frac{r_p - r_f}{\sigma_p} \sigma_m$$

- Treynor's ratio

$$Treynor = \frac{r_p - r_f}{\beta_P}$$

- Sortino's ratio

$$Sortino = \frac{r_p - r_f}{DSR}$$

Different «risk» measures: absolute and relative st.dev., beta (relative market volatility), *downside risk*

- MWRR

$$MWRR = R(t_0, T) = \frac{V(T) - V(t_0) - F}{\overline{V}(t_0, T)}$$

Effective *performance* based on individual choices: net in/outflows and average invested amounts

- Tracking error

$$TE = \sigma_{r_p - r_B}$$

St. dev. of differences in returns from benchmark

# PERFORMANCE MEASURES

**SHARPE RATIO** (similarly, on Beta, for Traynor)

HP:

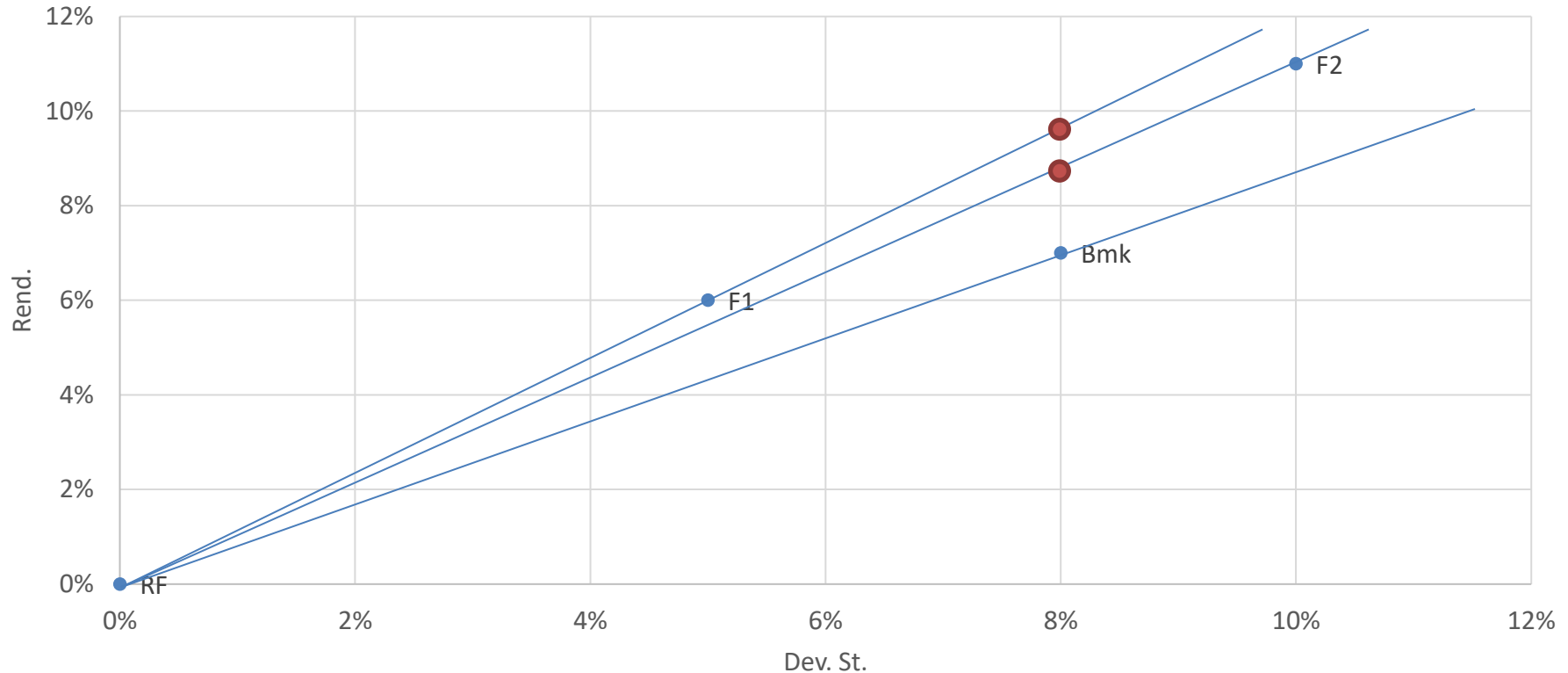- F1:              return 6%,              st.dev. 5%              SR= 1,2
- F2:              return 11%,            st.dev. 10%            SR= 1,1
- *Benchmark*:   return 7%,              st.dev. 8%              SR= 0,88
- *Risk free*:    return 0%,              st.dev. 0%
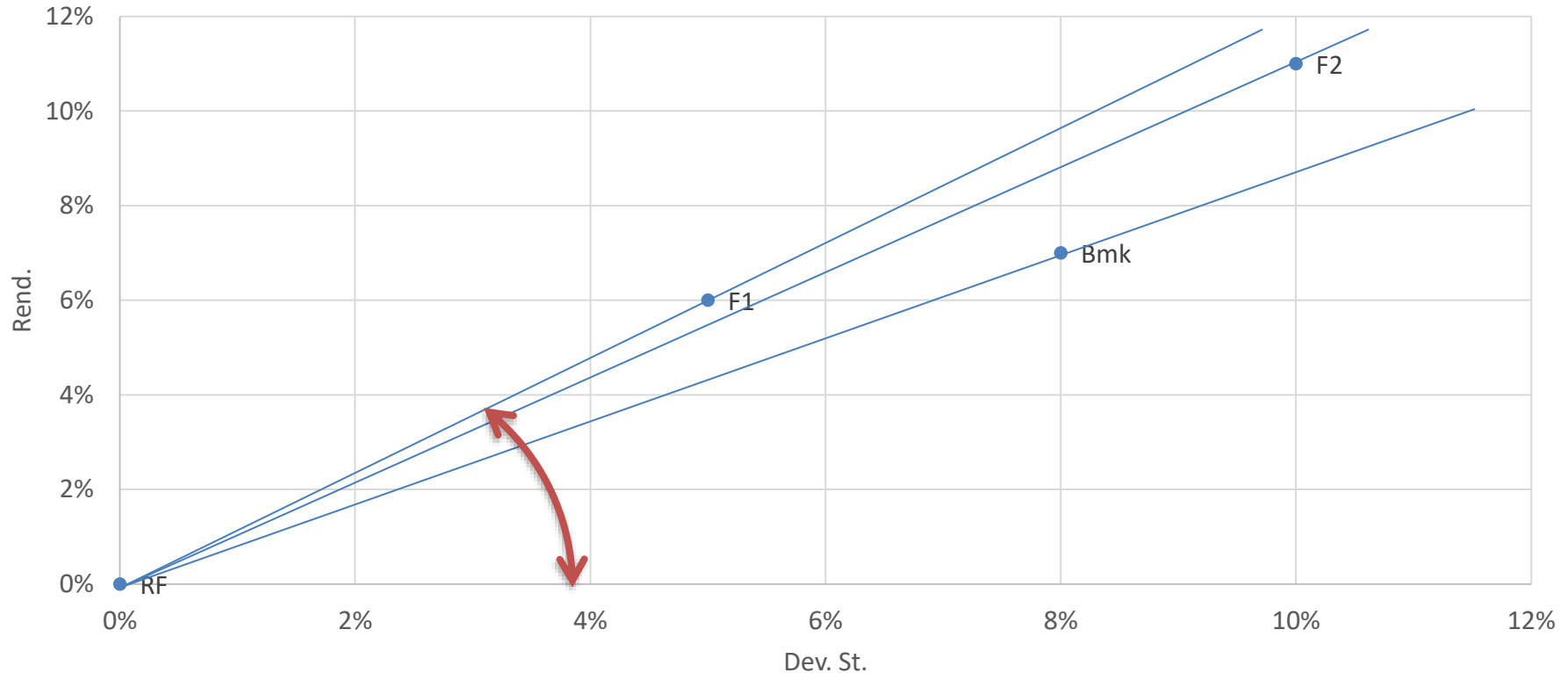
## RAP

HP:

- F1:            return 6%,            st.dev. 5%            SR= 1,2

- F2:            return 11%,            st.dev. 10%            SR= 1,1

- *Benchmark*:            return 7%,            st.dev. 8%            SR= 0,88

- *Risk free*:            return 0%,            st.dev. 0%

# TYPES OF MUTUAL FUNDS

Among several potential categories, a few emerge:

- **close-end**:

    - mutual funds' shares are fixed in number at the initial offering

    - withdrawals and new investments are not possible

    - entering/exiting only finding somebody willing to exit/enter

- **open-end**:

    - new investors can get new shares, buy-back/liquidation option

    - the fund has a variable number of shares

*Example*

*In 2016 Germany had:*

- *3.500 closed-end funds, AUM 83 bln €*
- *6.000 open-end funds, AUM of 1.800 bln €*

*Why?*

# TYPES OF MUTUAL FUNDS

Main investment 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

Worldwide Net Sales of Regulated Open-End Bond Funds Fell in 2020
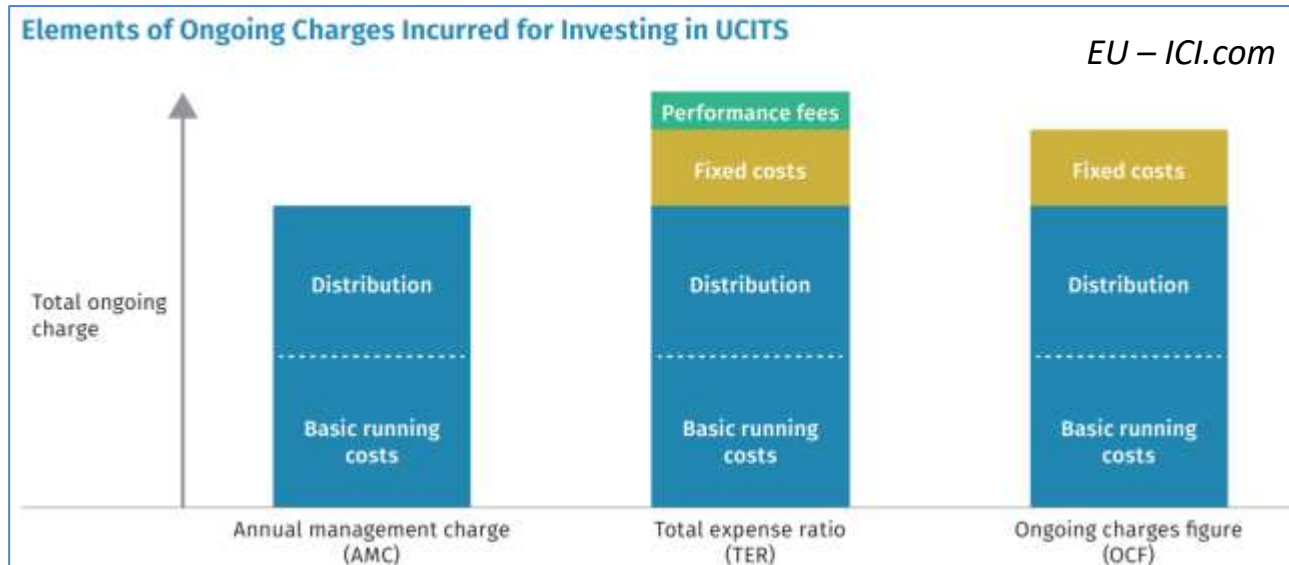Billions of US dollars by type of fund, annual
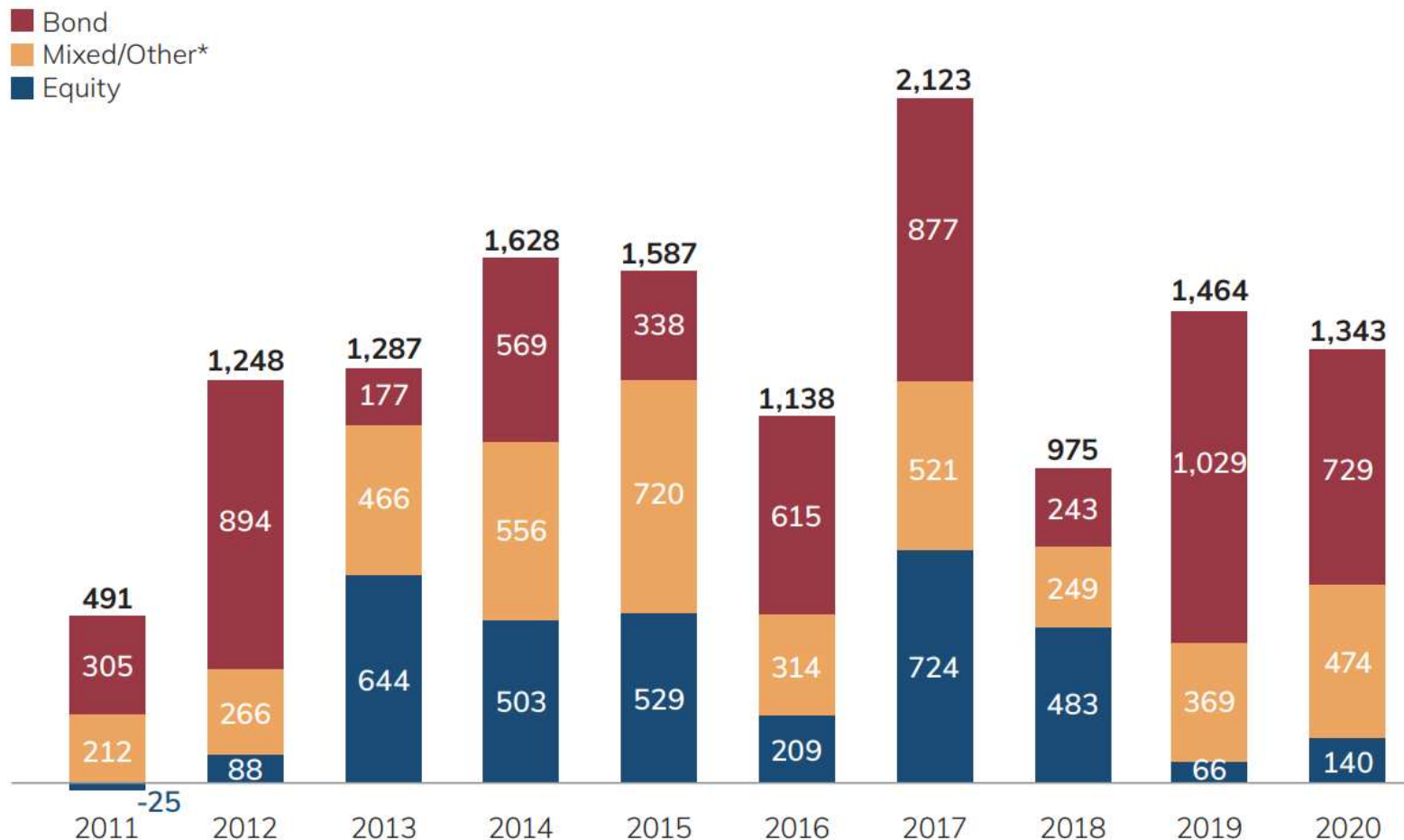
# COSTS OF MUTUAL FUNDS

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**

- ...



*EU – ICI.com*

Elements of Ongoing Charges Incurred for Investing in UCITS

| Annual management charge (AMC) | Total expense ratio (TER) | Ongoing charges figure (OCF) |
|---|---|---|
| Distribution / Basic running costs | Performance fees / Fixed costs / Distribution / Basic running costs | Fixed costs / Distribution / Basic running costs |

Total ongoing charge

Investors in UCITS Pay Below-Average Ongoing Charges
Percent

(US only)



**Mutual Fund Expense Ratios Tend to Fall as Fund Assets Rise**

Share classes of actively managed domestic equity mutual funds continuously in existence since 2000[1]
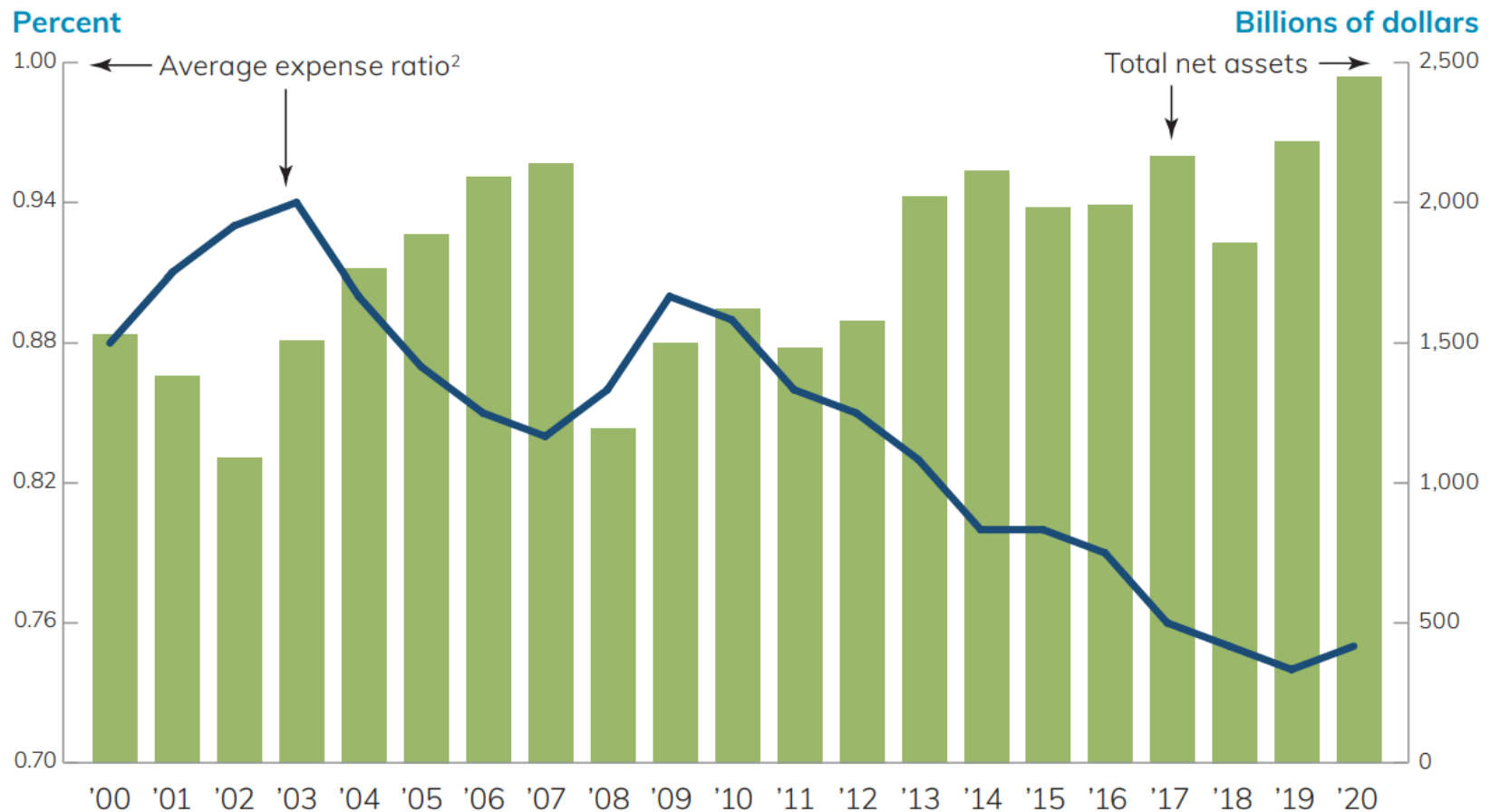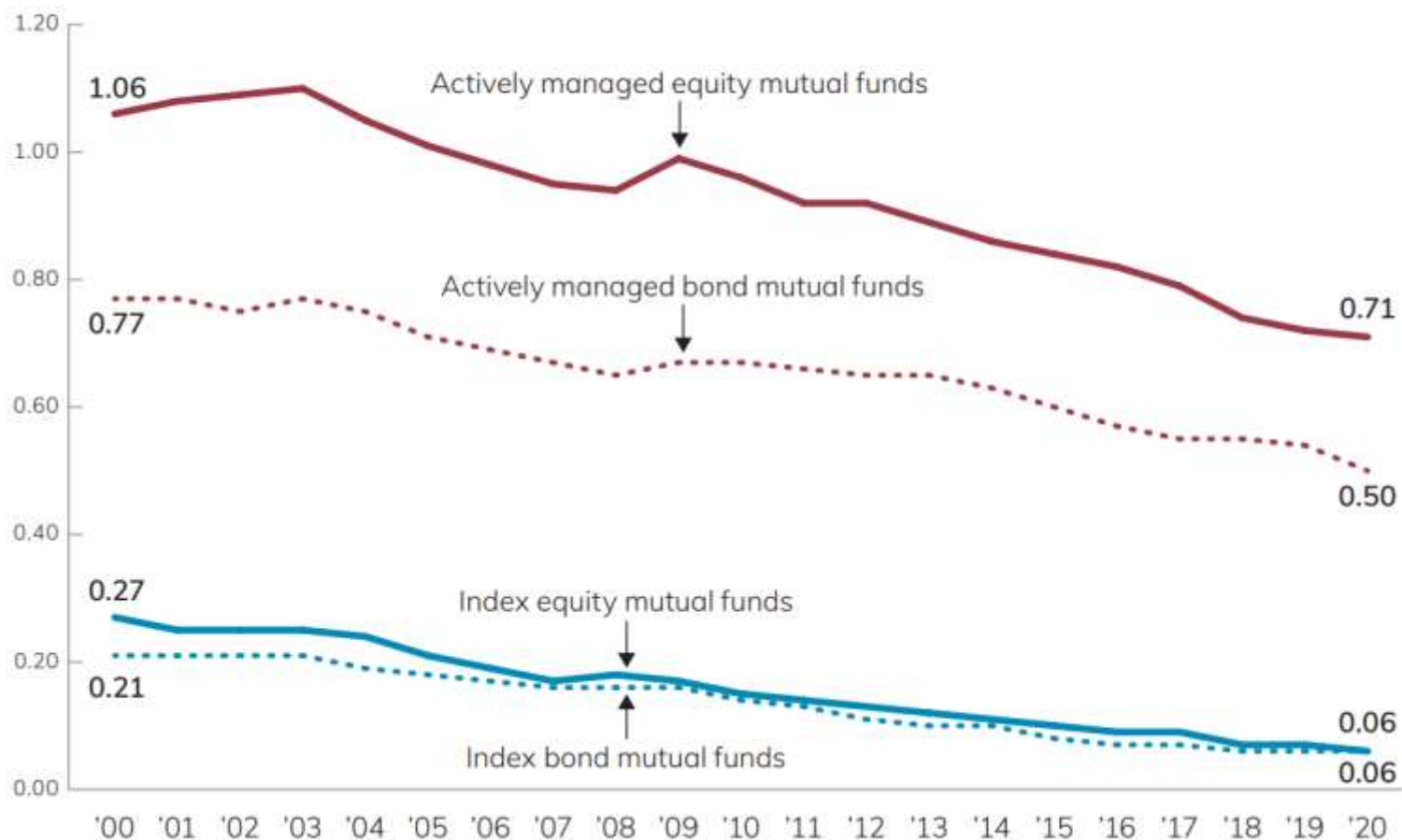
# GLOBAL SNAPSHOT (2020 ICI DATA)

(US only)



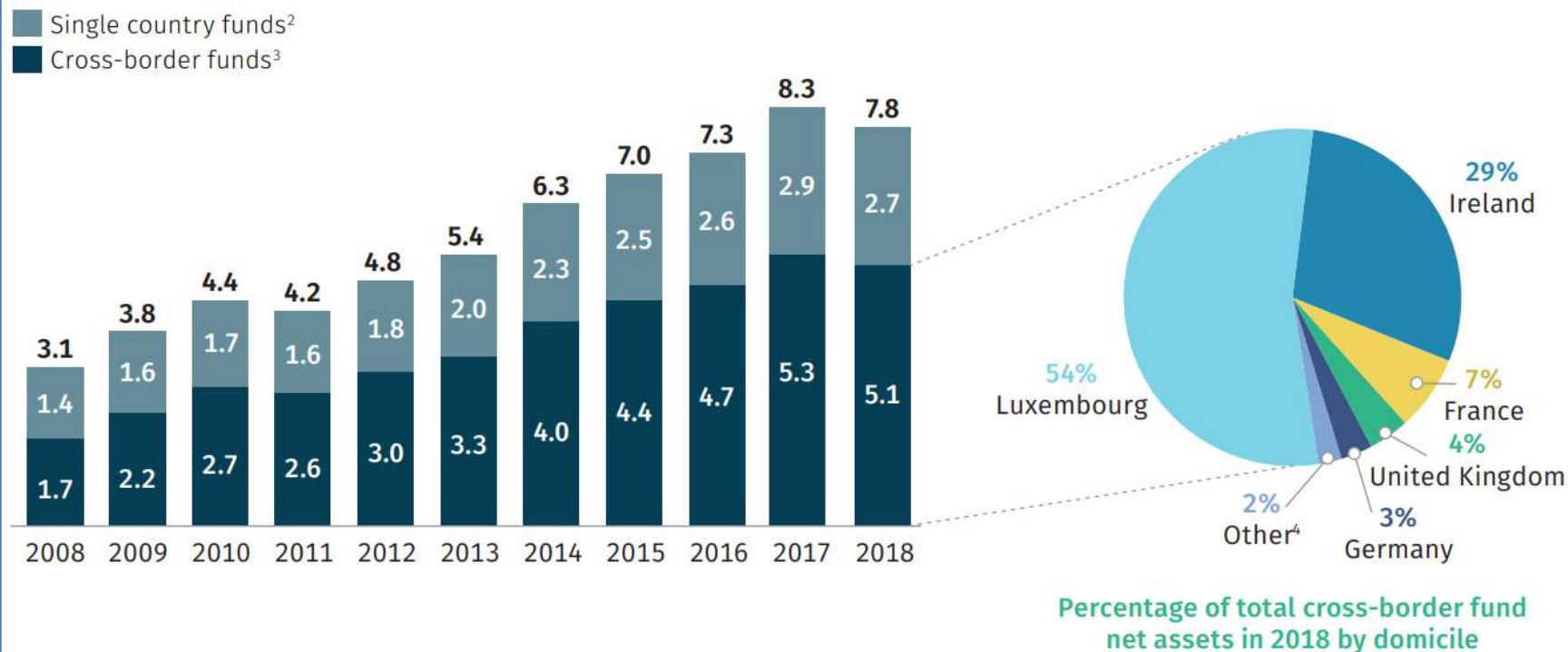**Expense Ratios of Actively Managed and Index Mutual Funds Have Fallen**
Percent

FIGURE 12

*EU – ICI.com*

**Cross-Border Funds Represent Nearly Two-Thirds of Total UCITS Net Assets**

Total UCITS net assets in trillions of euros,[1] year-end

- Single country funds[2]
- Cross-border funds[3]

Percentage of total cross-border fund net assets in 2018 by domicile

As of 2018, over 60% of ETF belongs to IRE

19

# 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 |

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

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

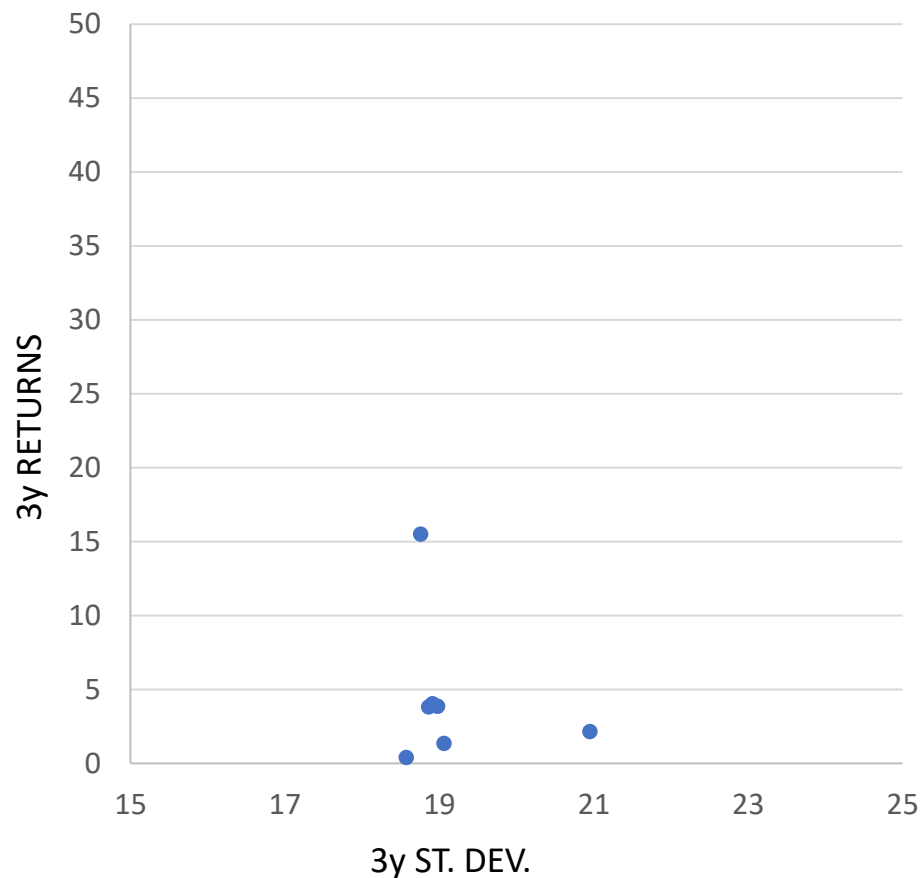|  | Fund 1 A | Fund 2 A | Fund1 B | Fund 2 B |
|---|---|---|---|---|
| 5 y | 1.20 | 1.23 | 1.35 | 1.38 |
| 10 y | 1.72 | 1.76 | 1.48 | 1.51 |
| 15 y | 2.77 | 2.83 | 1.89 | 1.93 |
| 20 y | 5.00 | 5.10 | 2.71 | 2.77 |

20

# EXAMPLES

2. Several websites provide plenty of data on mutual funds (f.i. Morningstar). Consider the following comparison of Italian funds specialised in Italian stocks and dedicated to the retail market (07/2017). Comments?
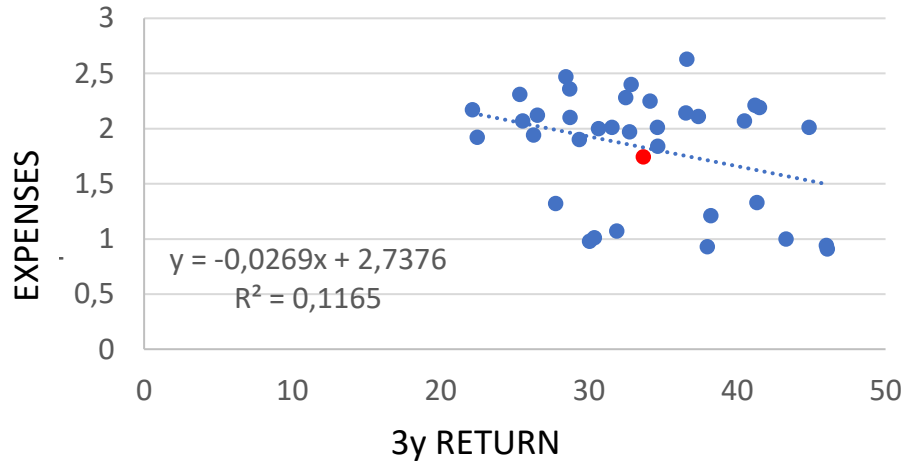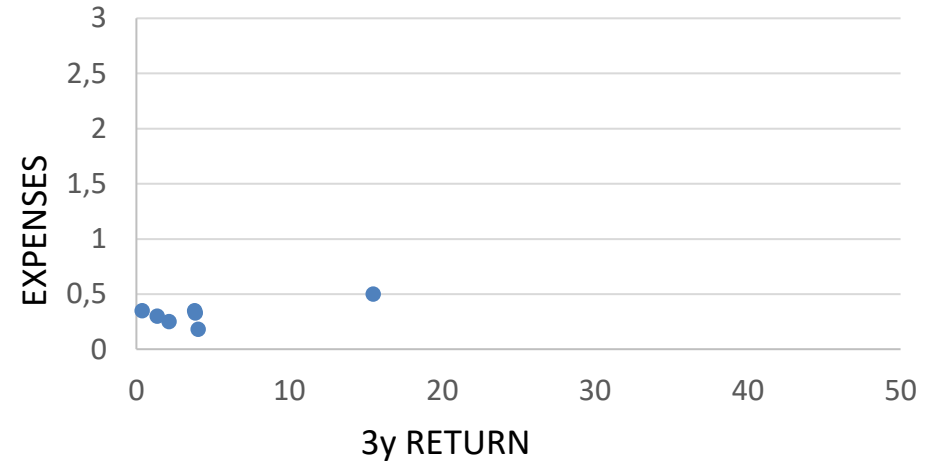


MUTUAL FUNDS

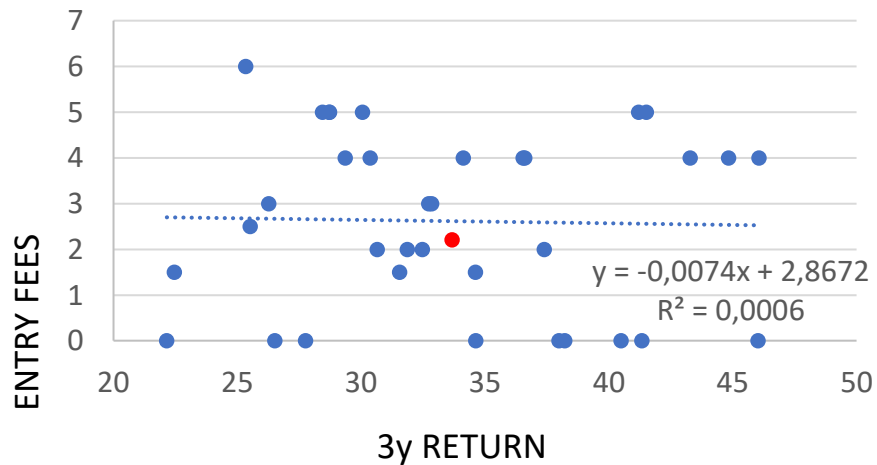$y = 2{,}0721x - 6{,}0457$
$R^2 = 0{,}5865$
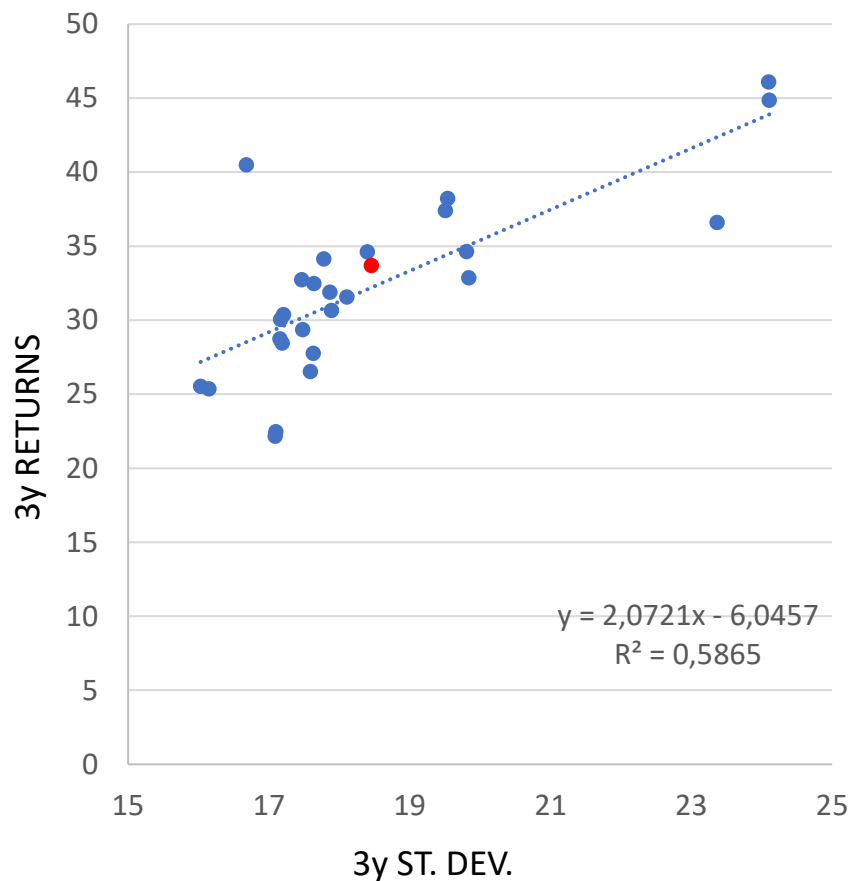
ETF

# EXAMPLES



MUTUAL FUNDS

y = -0,0269x + 2,7376
R² = 0,1165

ETF

MUTUAL FUNDS

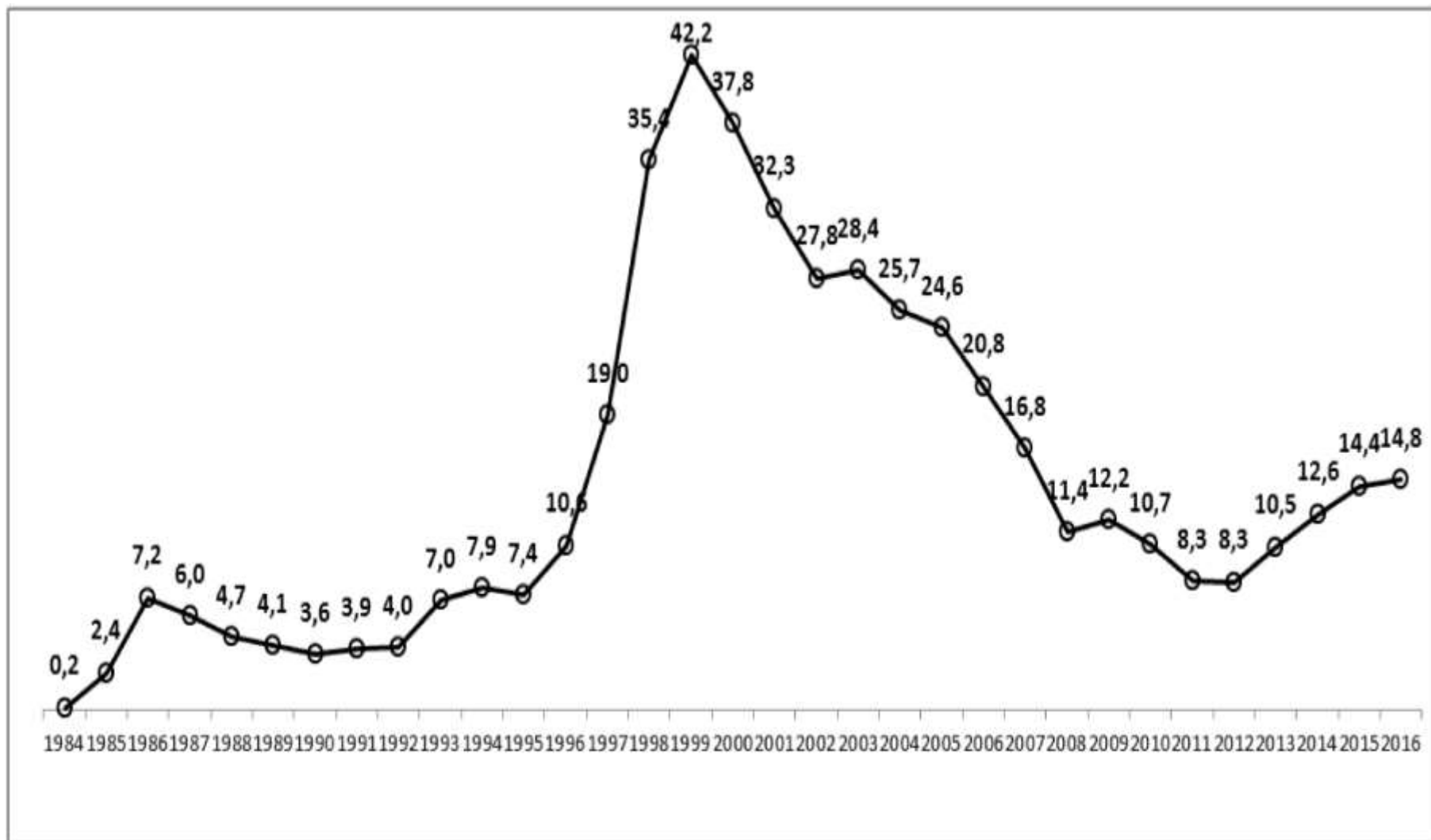y = -0,0074x + 2,8672
R² = 0,0006

MUTUAL FUNDS

y = -0,1742x + 14,517
R² = 0,039
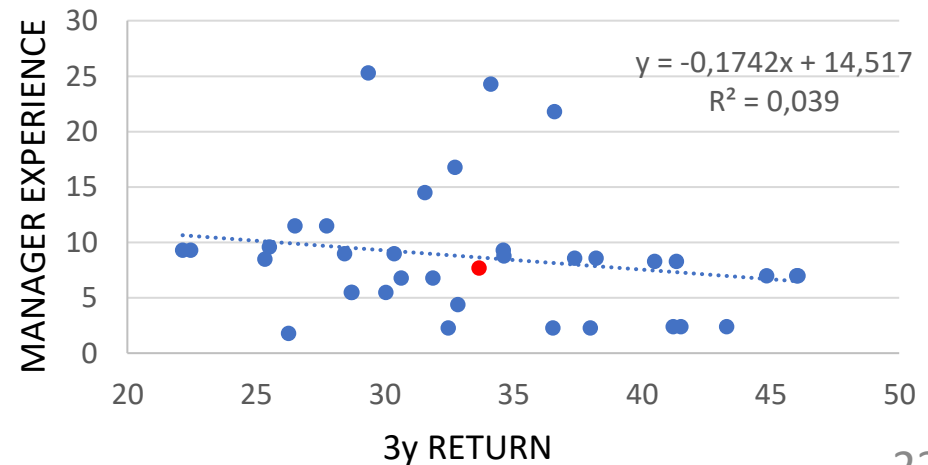
# EXAMPLES

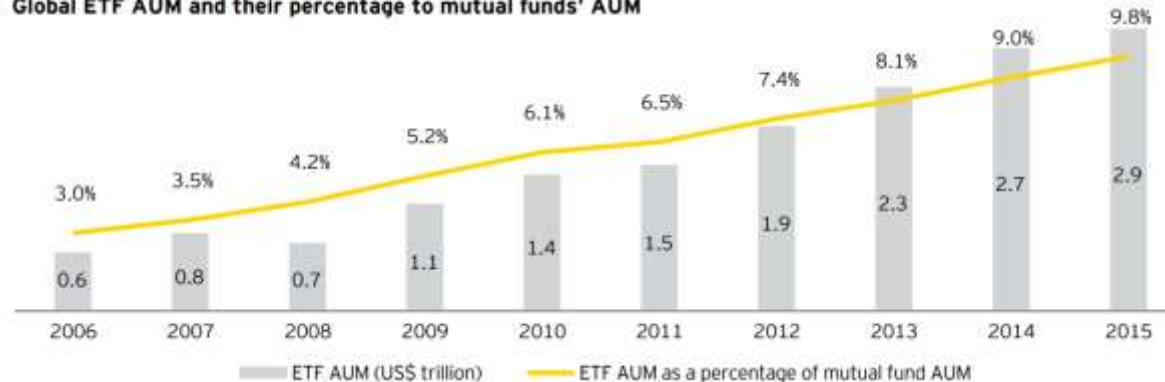3. Italian mutual funds AUM as % of GDP. Comments?

5. Passive or active?

**10 year selected global fund performance data (as of December 2015)**

| Region and risky asset | Active managers | Benchmark | Difference |
|---|---|---|---|
| France equity | 4.0% | 4.7% | (0.8%) |
| Germany equity | 6.6% | 7.4% | (0.8%) |
| Italy equity | 0.0% | (0.9%) | 0.9% |
| Spain equity | 2.6% | 2.9% | (0.3%) |
| Netherland equity | 3.1% | 7.2% | (4.1%) |
| U.S. equity | 5.8% | 7.4% | (1.6%) |
| U.S. real estate | 5.4% | 7.3% | (1.9%) |
| U.S. long-term government bonds | 3.8% | 6.7% | (2.9%) |
| U.S. short-term government bonds | 2.2% | 2.5% | (0.3%) |
| U.S. MBS | 3.9% | 4.6% | (0.7%) |
| Emerging markets bonds | 4.4% | 6.7% | (2.3%) |

**Share of global asset management market**
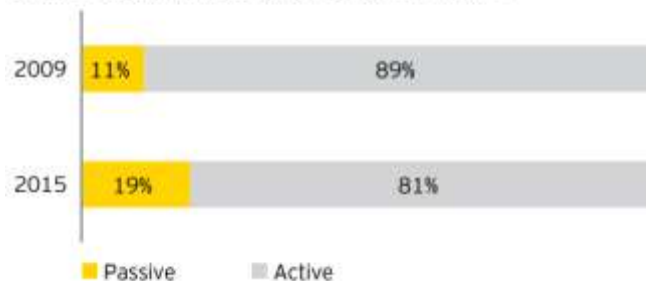
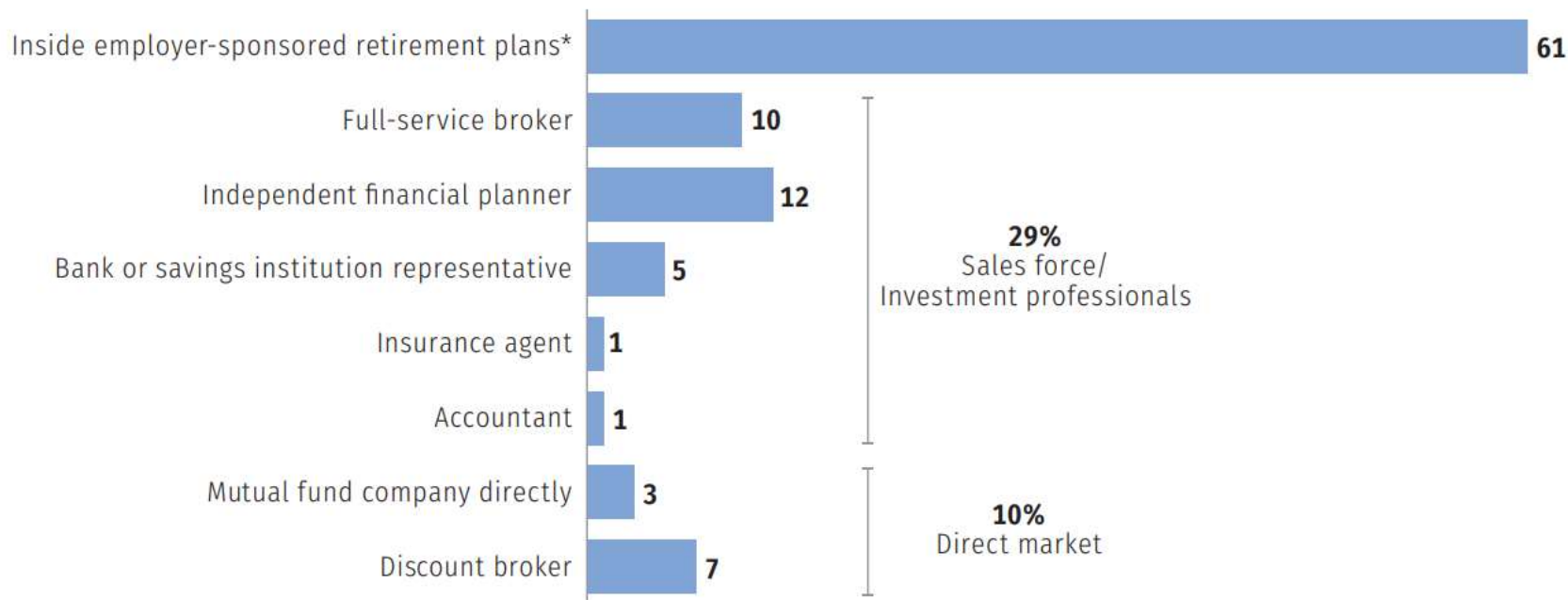**Global ETF AUM and their percentage to mutual funds' AUM**



24

6. Investors' profile (US)

## Mutual Fund–Owning Households by Primary Source for Purchasing Funds

Percentage of US households owning mutual funds, 2021



| Source | Value |
|---|---|
| Inside employer-sponsored retirement plans* | 61 |
| Full-service broker | 10 |
| Independent financial planner | 12 |
| Bank or savings institution representative | 5 |
| Insurance agent | 1 |
| Accountant | 1 |
| Mutual fund company directly | 3 |
| Discount broker | 7 |

29% Sales force/Investment professionals

10% Direct market

*Employer-sponsored retirement plans include DC plans (such as 401(k), 403(b), or 457 plans) and employer-sponsored IRAs (SEP IRAs, SAR-SEP IRAs, and SIMPLE IRAs).

25

# EXAMPLES

6. Investors' profile (US)

## Generation of head of household

- ■ Silent and GI Generations (born between 1904 and 1945)
- ■ Baby Boom Generation (born between 1946 and 1964)
- ■ Generation X (born between 1965 and 1980)
- ■ Generation Z and Millennials* (born between 1981 and 2012)

Households owning mutual funds: 9, 33, 30, 28

Households' mutual fund assets: 10, 49, 27, 14

*Generation Z (born 1997 to 2012) and the Millennial Generation (born 1981 to 1996) are aged 9 to 40 in 2021; however, survey respondents must be 18 or older.

Note: Generation is based on the age of the household sole or co-decisionmaker for saving and investing.

26