Long-Term Investment for Retirement

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Course Outline

What is Retirement Planning?

- Process of determining retirement income goals and the actions needed to achieve them.
- Involves estimating future expenses, sources of income, and creating a savings strategy.
- Accounts for inflation, healthcare costs, and longevity.
- Aims to ensure financial independence in retirement.

Common Misconceptions About Retirement

- **"I can start saving later"** – Delaying reduces compounding benefits.
- **"The state pension will be enough"** – Often insufficient to maintain lifestyle.
- **"I'll spend less when retired"** – May underestimate healthcare, travel, or housing costs.
- **"I can work indefinitely"** – Health or job market changes may prevent this.

Why Long-Term Investing?

- Compounding returns can turn small investments into large sums over time.
- Helps to combat inflation and maintain purchasing power.
- Supports goals such as financial independence and early retirement.
- Provides security and peace of mind for later stages of life.

Understanding Investment Horizons

- **Short-term investing:** Investment horizon of less than 5 years. Typically involves lower-risk assets like cash, savings accounts, or short-term bonds.
- **Long-term investing:** Time horizon of 10+ years. Allows for exposure to higher-return assets like equities.
- **Volatility vs. Time:** Over longer periods, market volatility tends to smooth out. Historically, equities outperform other asset classes over 15-20 years.
- **Example:** A one-time investment of €10,000 at 6% annual return grows to €32,000 in 20 years.

The Power of Compounding

- **Compounding** is the process by which returns are reinvested to generate additional earnings over time.
- **Formula for one annuity:** $A = P(1 + r)^n$
- without compounding (for one annuity): $A = P(1 + n * r)$
- **Example:**
  - Invest €5,000 annually for 30 years at 5% return.
  - Total invested = €150,000
  - Final amount[1] = €348,000
  - Final amount without compounding (simple interest)[2] = €258,750
- **Lesson:** The earlier you start, the more compounding works in your favor.

[1] $FV = A \times \frac{(1+r)^n - 1}{r}$.

[2] The formula is not standard: $FV = A \times [n + r \times \frac{n(n-1)}{2}]$.

Why Start Early?

- Delaying investing by just 10 years can cut final retirement capital nearly in half.
- Younger investors can afford to take more risk, capturing higher returns.
- Starting early reduces pressure later in life to save large amounts.
- More flexibility to adapt to changes or unexpected events.

Do Your Own Simulation

- Savings and Retirement Simulation: ▸ Savings and Retirement Simulation

- The rate of return is adjusted for inflation, thereby accounting for the preservation of purchasing power.
- As a result, the constant monthly installments implicitly include an increase in line with the inflation rate.
- Consequently, if the average nominal rate of return you expect from your investments is $x\%$, and you estimate the average inflation rate to be $y\%$, then the rate of return to enter into the simulator is: $r = (x - y)$ % (an approximation that makes the calculation easier to do mentally).
- Financial investments for retirement savings are generally tax-exempt.
- Even if we have an estimate of the average long-term rate of return, the evolution of our investment will be random and not regular.
- What's more, we don't know when we'll die!

Overview of the French Retirement System

- Based on a pay-as-you-go system (repartition system).
  - ▸ Open Pay-as-you-go file
- Contributions from current workers fund current retirees.
- Public system supplemented by compulsory complementary systems.

Overview of the French Retirement System

The French retirement system is primarily based on three pillars:

1. **State Pension (Retraite de Base):**

Managed by social security (Caisse Nationale d'Assurance Vieillesse - CNAV). A mandatory pay-as-you-go pension plan system funded by social contributions from employees and employers. Benefits depend on your salary, years of contribution, and a specific calculation formula.

- Special situations: Civil servants and special regimes

Overview of the French Retirement System

2. **Supplementary Pension (Retraite Complémentaire):**

For private-sector employees, the supplementary pension is managed by schemes like Agirc-Arrco. It works on a points-based system where your contributions convert into pension points.

3. **Private Retirement Savings (Épargne Retraite):**

Voluntary savings options through various financial products, such as personal retirement accounts and other financial investments.

Recent Reforms and Retirement Age

- Gradual increase in legal retirement age
- Longer contribution periods required
- Incentives for late retirement
- PER reform to encourage private savings

Take a step further ▸ Take a step further

Plan d'Epargne en Actions (PEA)

- Tax-efficient investment account for equities
- Exempt from capital gains tax after 5 years
- Investment in EU stocks only (unless you're clever)
- The contribution limit for a classic PEA is 150,000 euros for each holder.

Assurance Vie

Assurance Vie is a versatile investment tool widely used in France for retirement savings:

- Offers flexibility in contributions and withdrawals.
- Provides tax benefits after 8 years of holding the product.
- Allows diversification of investments across various financial products.
- Flexible inheritance options

Plan Epargne Retraite (PER)

In addition to the state and supplementary pensions, individuals can enhance their retirement income through private savings.

The Plan d'Épargne Retraite (individuel or collectif) is a tax-advantaged retirement savings plan introduced in 2019, replacing older schemes like *PERP* and *Madelin*.

- Contributions to a PER are deductible from taxable income within annual limits. Typically, for Salaried Employees: 10% of your net professional income from previous year (after social contributions and professional costs), up to a maximum of €37,094.
- Funds are typically locked until retirement, with exceptions such as the purchase of a primary residence.
- Upon retirement, funds can be withdrawn as a lump sum, annuities, or a combination of both.

Investments in Real Estate

Real estate investment is another popular method to prepare for retirement in France:

- Rental income can supplement retirement pensions.
- Real estate offers long-term capital appreciation.
- Schemes like *Denormandie* (replacing the *Pinel* scheme) provide tax incentives for investing in rental older properties.

Other Investment Options

- Mutual funds and ETFs for diversification ▸ Open ETF file
- Direct investments in stocks and bonds

Dollar-Cost Averaging (DCA)

- **Definition:** Investing a fixed amount of money at regular intervals, regardless of market conditions.
- **Goal:** Reduce the impact of market volatility and avoid the pitfalls of market timing.
- **Mechanism:** You buy more shares when prices are low and fewer when prices are high.
- **Benefits:**
  - Smooths out purchase price over time
  - Encourages disciplined investing habits
  - Helps reduce emotional reactions to market swings
- **Example:** Investing €200 monthly in a stock fluctuating between €10 and €20 may result in a lower average cost per share over time.

Core Principles of Long-Term Investing

- **Diversification**
  - **Relevance to Retirement:** Retirement portfolios often span decades, so avoiding concentration risk is critical. If one asset class, sector or region underperforms (e.g., tech or U.S. stocks), other holdings (like bonds or emerging markets) can help balance losses.
  - **Application:** Use diversified ETFs or index funds covering:
    - World equities
    - European or World Bonds (government, corporate, short/long-term)
    - Alternative assets (e.g., real estate or REITs, Gold)
- **Risk Tolerance**
  - **Relevance to Retirement:** Capacity to take risk change over time:
    - **Young investors:** Can handle more risk (higher stock allocation) due to a long time horizon.
    - **Near or in retirement:** Typically need more stability (higher bond/cash allocation) to avoid "sequence-of-returns" risk (i.e., bad returns early in retirement can permanently damage a portfolio because even if the market recovers later, you've already spent part of the portfolio, so you can't fully benefit from the rebound.).
  - **Application:** Gradually reduce stock exposure as you approach retirement.

Core Principles of Long-Term Investing

- **Rebalancing**
  - **Relevance to Retirement:** Market movements can distort your portfolio (e.g., stocks grow faster than bonds), increasing risk unintentionally.
  - **Application:** Rebalance annually or when allocations drift $\sim$5–10% from targets.
  - **Example:** If your target is 70% stocks, but growth pushes it to 80%, sell 10% of stocks and buy bonds to reset balance.
- **Cost Efficiency**
  - **Relevance to Retirement:** High fees compound against you over decades, quietly eroding returns.
    - Use low-cost index funds or ETFs (e.g., Amundi, Vanguard, iShares).
    - Avoid high-turnover or actively managed funds unless justified.
    - Maximize contributions to tax-advantaged accounts (U.S.: 401(k), Roth IRA; France: PEA, PER) to reduce taxes and allow compounding to work efficiently.

Example Asset Allocation by Age (Rule of Thumb)

- The financial theory known as Markowitz Portfolio Theory allows you to determine the optimal weights you will invest in each asset class. Although theoretically sound, this model is difficult to put into practice. Thus, practitioners often follow some rules of thumb.
- Rule of thumb: **110 - your age = % in stocks**
- Younger investors: higher stock allocation (growth)
- Older investors: increase bonds and cash (stability)

Age	Stocks	Bonds	Cash
25	85%	15%	0%
35	75%	25%	0%
45	65%	30%	5%
55	55%	40%	5%
65	45%	45%	10%
75	35%	50%	15%

Importance of International Diversification

- Reduces country-specific risk
- Access to growth in global markets
- Euro-zone diversification vs. emerging markets

Investment Risks

- Market risk: fluctuations in stock prices
- Inflation risk: erosion of purchasing power
- Longevity risk: surviving your savings
- Currency risk for international assets

Behavioral Finance Pitfalls

- Panic selling during downturns
- Overconfidence and overtrading
- Following the herd (herding behavior)
- Recency bias (biais de récence) affecting decisions. You're investing for the long term, so you need to consider a long data history when making your decisions.

Potential Benefits

The stock market can be a powerful tool for long-term saving, but it's important to understand the potential rewards and risks before investing.

- **Higher Returns:** Historically, stocks have outperformed many other investment options over the long term, offering the potential for significant growth.
- **Inflation Hedge:** Stocks can help protect your savings from the eroding effects of inflation, as company earnings and dividends tend to increase over time.
- **Compounding Growth:** Reinvesting dividends and capital gains can significantly boost your returns over time through the power of compounding.
- **Diversification:** Investing in a diversified portfolio of stocks can help spread risk and reduce the impact of individual company performance on your overall investment returns. But this not enough (other asset classes must be considered too)!

Potential Risks

- **Market Volatility:** Stock prices can fluctuate significantly in the short term, potentially leading to losses.
- **Inflation Risk:** While stocks can be an inflation hedge, there's no guarantee that they will keep pace with inflation in all economic conditions.
- **Company-Specific Risk:** Individual companies can face challenges that impact their stock prices, such as competition, technological disruption, or economic downturns.
- **Investment Fees:** Investment fees, such as brokerage commissions and expense ratios, can eat into your returns over time (ETFs are one solution).

Take a step further ▸ Take a step further

Descriptive statistics for annual returns

Can you comment the following statistics?

Asset	Aritm. Mean (%)	Geo. Mean (%)	Volat. (%)	Min (%)	Max (%)	Skew.	Kurto	Final Value of 1$
S&P 500	11.79	9.94	19.49	-43.84 (1931)	52.56 (1954)	-0.455	0.063	9828.18
3-M T.Bills	3.36	3.31	3.0	0.03 (2014)	14.04 (1981)	1.016	0.95	23.61
10-Y T.Bonds	4.79	4.5	7.94	-17.83 (2022)	32.81 (1982)	0.72	1.811	71.59
Real Estate	4.41	4.23	6.21	-12.00 (2008)	24.10 (1946)	0.334	1.219	55.54
Gold	6.75	5.12	20.76	-32.60 (1981)	126.55 (1979)	2.586	11.891	126.49
Inflation	3.11	3.04	3.92	-10.27 (1932)	18.13 (1946)	0.313	4.117	18.22

Table 1: Descriptive statistics for annual returns (1928–2024)

Note: Data source: Damodaran (NYU Stern).
Mean and volatility are annualized percentages.
Cumulative return: total gain over the period.

Historical returns for different asset classes

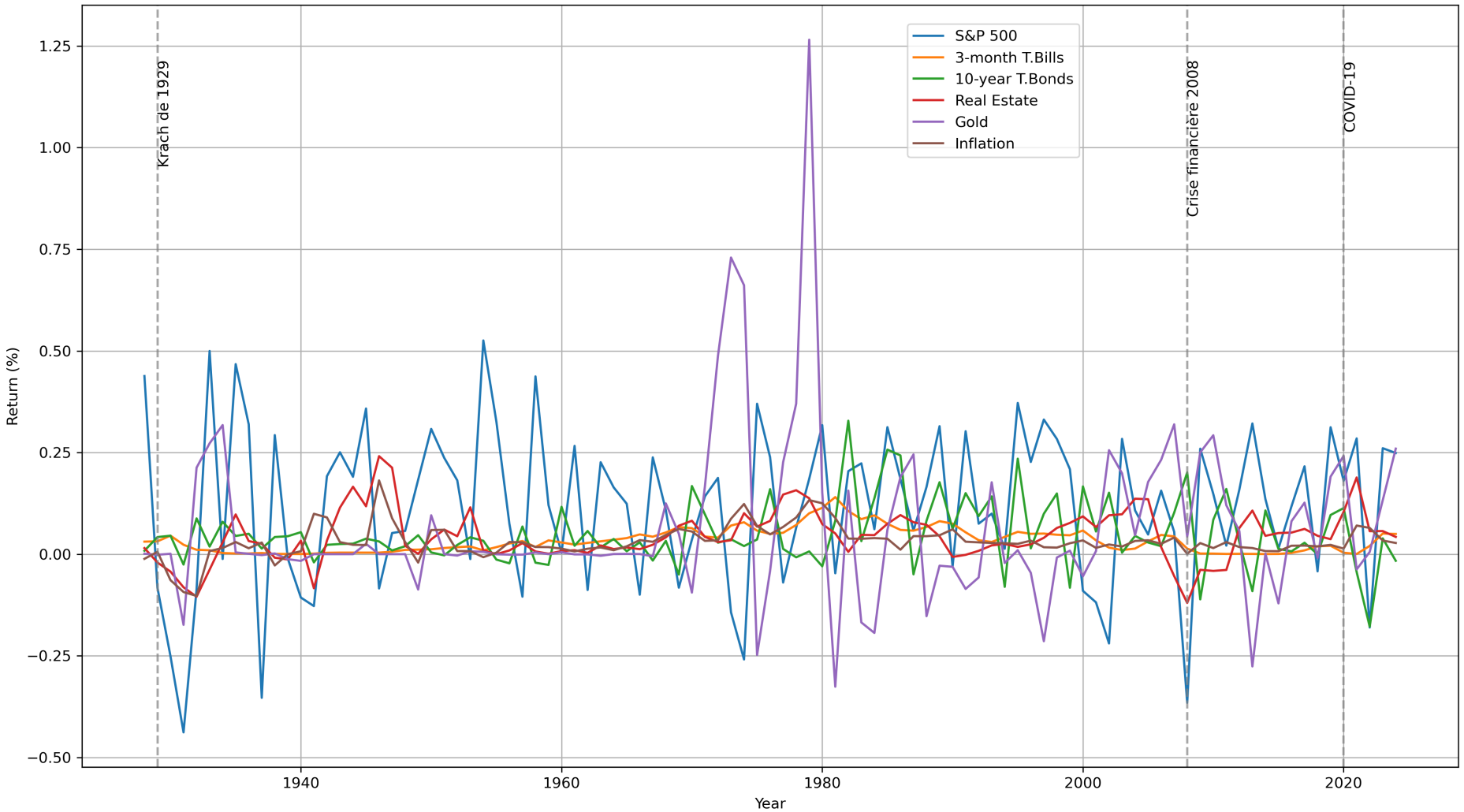

Figure 1: Un graphique montrant l'évolution des données.

Correlation matrix

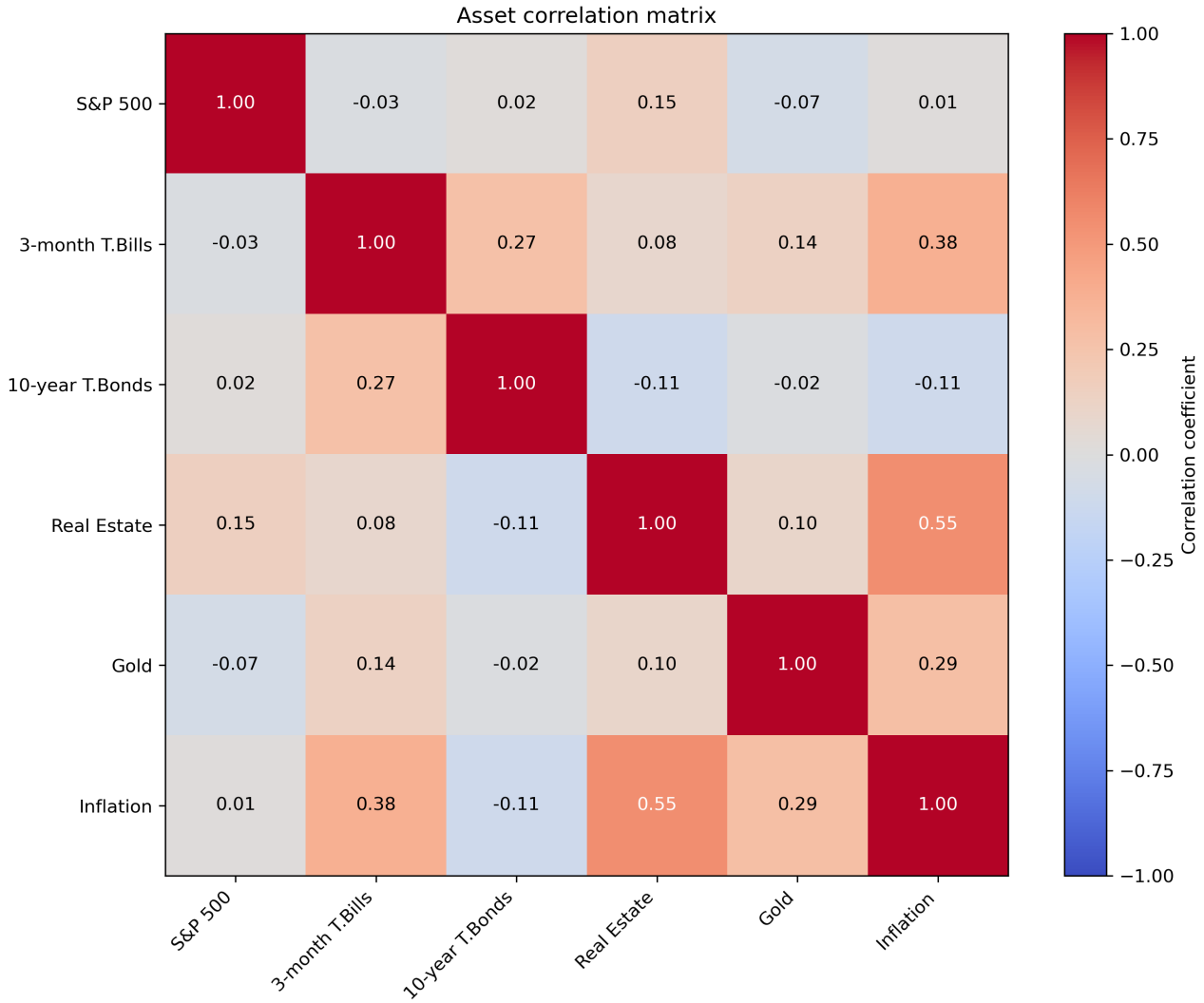

Figure 2: Correlation matrix (1928–2024).

Cumulative returns for different asset classes

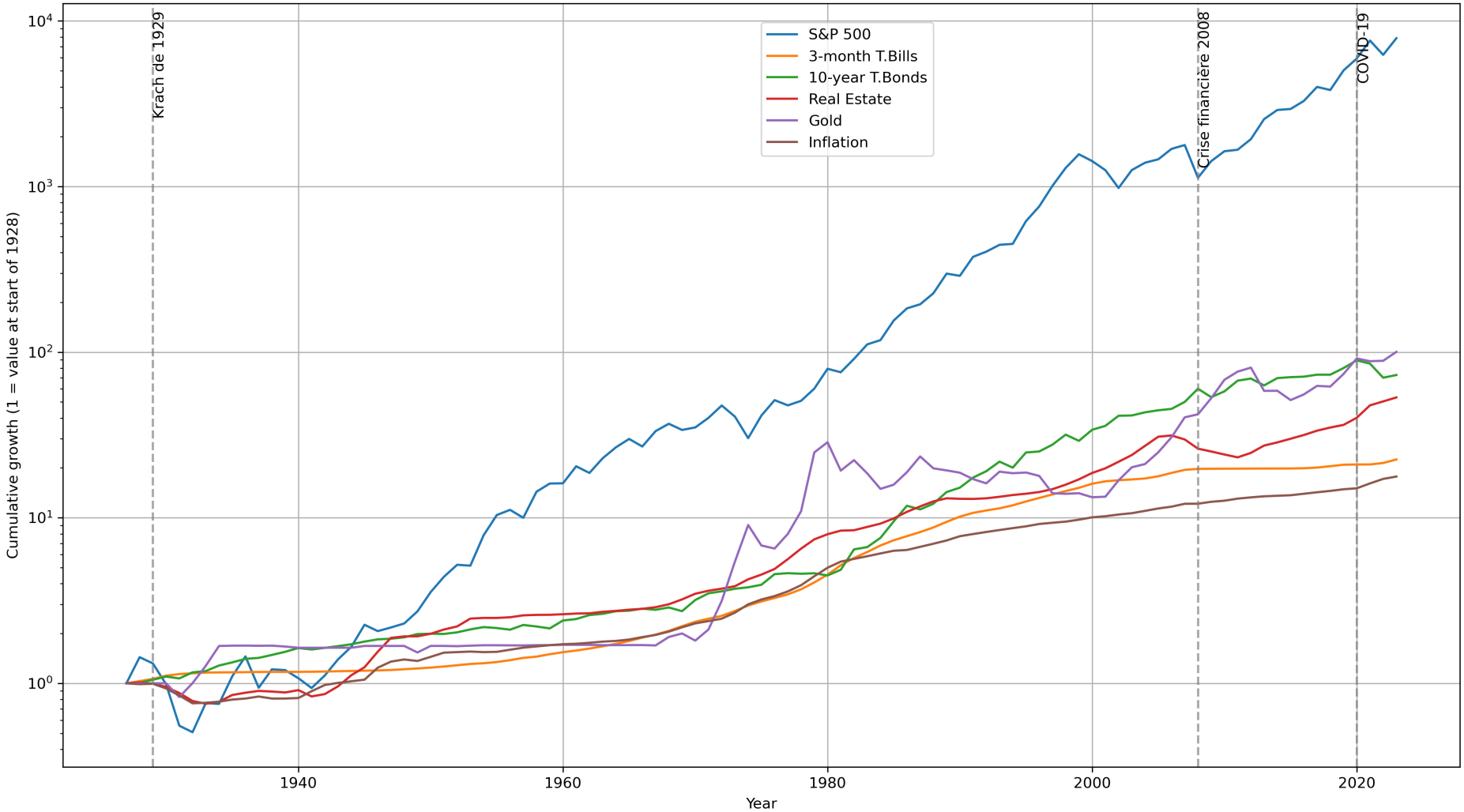

Figure 3: Cumulative returns for different asset classes (1928–2024).

Cumulative returns for different asset classes

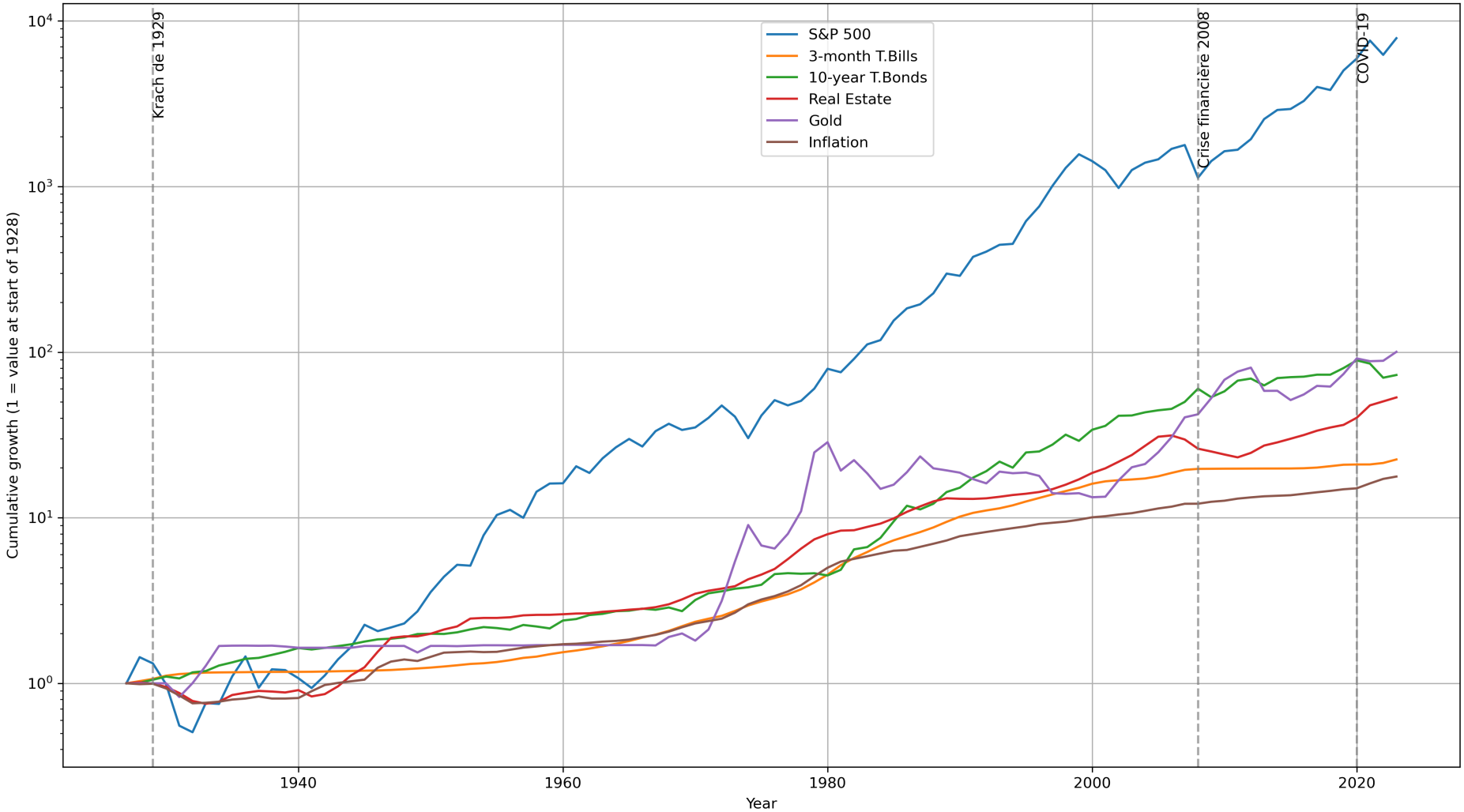

Figure 4: Cumulative returns for different asset classes (1928–2024).

Autocorrelation Function (ACF) of Returns

ACF describes how much current return value is related to its past values.

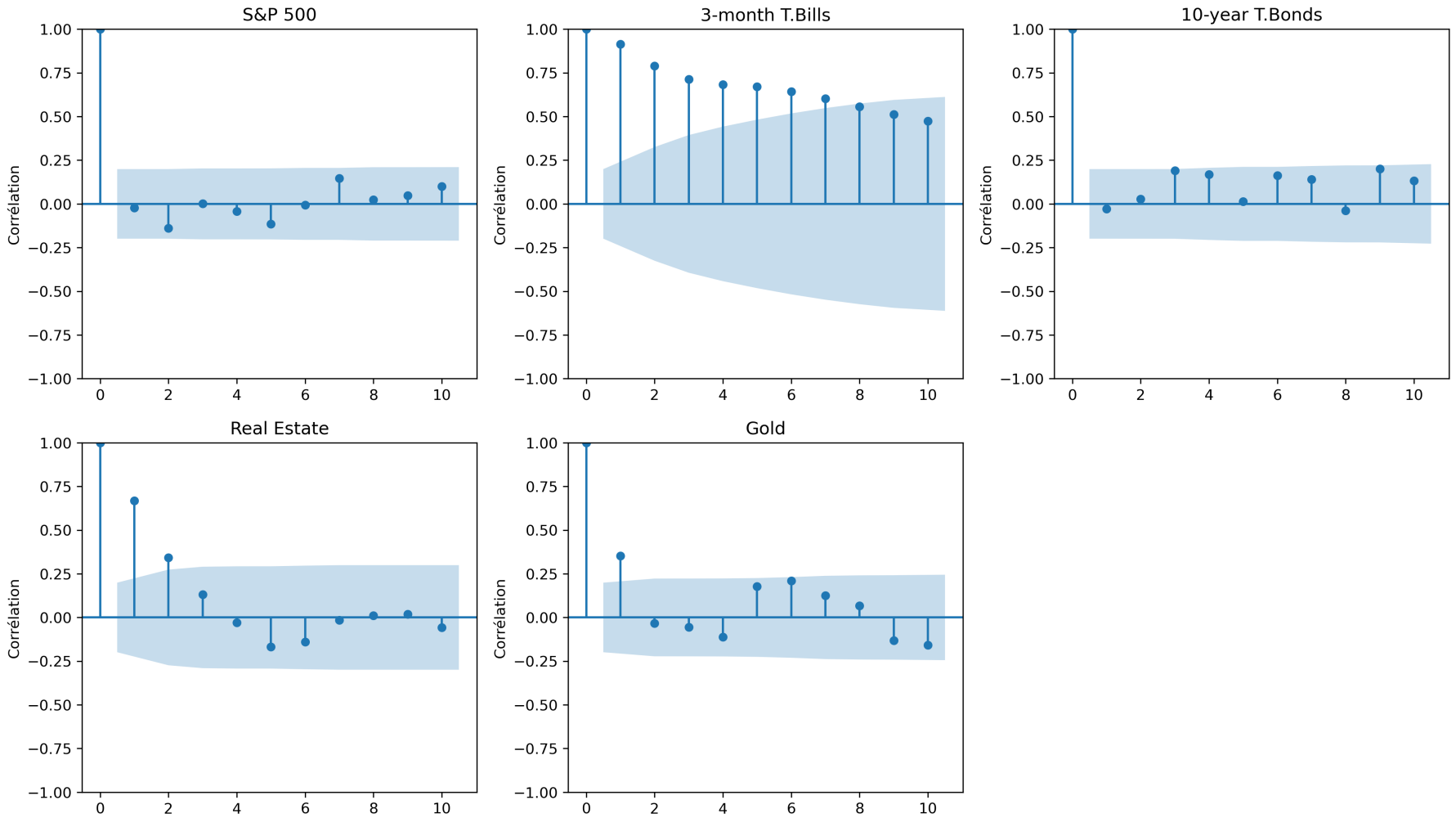

Figure 5: ACF of returns for different asset classes (1928–2024).

Case Study: Long Term Portfolio Simulation

- You and your team members are portfolio Manager at "Finally Freedom Pension Fund".
- You need to manage a $12 000/Year portfolio to provide for the retirement of individuals who are currently 23 years old
- Your management horizon is 40 years. The simulation will be carried out in 4 periods of 10 years each.
- You can invest in the following 5 assets: money market, bonds, equities, gold and real estate
- We will use annual data for these 5 assets over the period 1928-2024 for the US Markets (the only data available).

Case Study: Long Term Portfolio Simulation

- At the start each team must decide a portfolio allocation for the next 10 years
- After the first run, you must compute your portfolio performance (rate of return) each year.
- Then, based on these 10 portfolio returns, compute your average return, the standard deviation of your portfolio returns, and your portfolio's Sharpe Ratio.
- You must then decide whether to maintain the same portfolio weighting or change its composition for the upcoming ten-year management period.
- And it goes on for 3 additional runs.

Key Takeaways

- Time and consistency are the investor's best allies
- Take advantage of tax-advantaged accounts (PER, PEA, Assurance Vie)
- Educate yourself and avoid emotional decisions
- Plan and review your strategy regularly

Questions and Discussion

Thank You For Your Attention

Questions?