

The Basics of Investing for Retirement

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Summer 2025

- A **Stock** represents ownership in a company
 - If a firm has a total of 100 stocks (AKA **Shares**) and you have one then you own 1% of that firm
- **Shareholders** earn money from payments made to owners proportional to their ownership, called **Dividends**
 - If a firm profits \$100,000 dollars then you get \$1,000 of it
 - So stocks have *intrinsic* value
- Stocks also earn money as the price goes up, called **Capital Gains**
 - If people expect future dividends to increase then the price will increase to reflect that
 - Stock prices are forward-looking
- Thus the total gain (AKA **Return**) from a stock are its dividends plus capital gains

See chapter 4 of freefinancebook.com for more related information.

- Money grows exponentially and so you should invest ASAP

$$\text{Value In One Year} = \text{Value Today} \times (1 + \text{Return This Year})$$

- Suppose Apple (AAPL) is \$200 today has a return of 10% this year

$$\text{Apple's Price In One Year} = \$200 \times (1 + .1) = \$220$$

- What if it has the same return the following day?

$$\text{Apple's Price In Two Years} = \$220 \times (1 + .1) = \$242$$

- Notice the stock grew 10% each time, but 10% was \$2 more the second year
 - This is because the 10% growth the second year is not only based on the initial \$200, but also the \$20 of growth in the first year. This is called **Compound Interest**.

- We can solve for the (expected) value in two years with what we know today

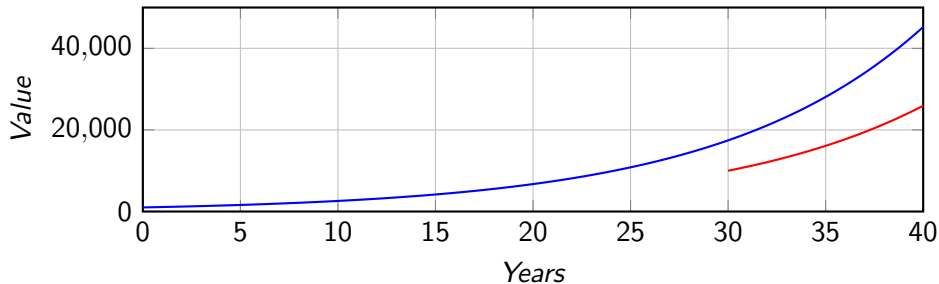
$$\begin{aligned} \text{Price In Two Years} &= \text{Price Today} \times (1 + \text{Return This Year}) \times (1 + \text{Return Next Year}) \\ &= \underbrace{\$200 \times (1 + .1)}_{=\$220} \times (1 + .1) \\ &= \$200 \times (1 + .1)^2 \\ &= \$242 \end{aligned}$$

- If we expect return to be the same in all future periods (as we do here), we can rewrite this

$$\underbrace{\text{Price In } n \text{ Periods}}_{\text{Future Value}} = \underbrace{\text{Price Today}}_{\text{Present Value}} \times (1 + \text{Expected Return})^n$$

- This will allow us to solve for much larger time horizons

See chapter 2 of freefinancebook.com for more related information.



- **Blue:** Invest \$1,000 now (age 20) and expect a 10% return per year until you retire at 60

$$\text{Value At 60} = \$1,000 \times (1.1)^{40} = \$45,259.26$$

- **Red:** Invest \$10,000 in 30 years (age 50) and expect a 10% return per year until you retire at 60

$$\text{Value At 60} = \$10,000 \times (1.1)^{10} = \$25,937.42$$

Play around with investment scenarios at one of many online calculators here



- Returns follow a "random walk"
 - Returns follow a general trend upwards over time
 - In each given year, returns are almost random
- Returns are not constant each year, but over long time periods returns are predictable

Time Horizon	Probability of Positive Return
1 Day	53.1%
1 Month	62.8%
1 Year	74.7%
5 Years	87.5%
10 Years	94.1%
20 Years	100%

- If you save for a short time you may lose money
- If you save over a long enough time, you guarantee positive returns

Per CRSP data on S&P 500 from 1926-2023.

- Stock market as a whole has averaged a 10% annual return over past 100 years
- Many people "pick" stocks to try to outperform the market, called **Active Investors**
- 2 types of active investors
 - DIY
 - Do you *really* know why you should pick a certain stock/company?
 - Why that specific company and not one of the thousands (~6,000) of others? Do you know all of the possible companies to invest in?
 - **Mutual Funds**: Actively managed funds, stocks are chosen by the fund manager
 - Fees, fees, and more fees!
- Others invest in the entire market and earn the average, called **Passive Investors**
- Over 10 years, 80-90% of professional active investors under-perform the market (and thus passive investors), on average

See chapter 6 of freefinancebook.com for more related information.

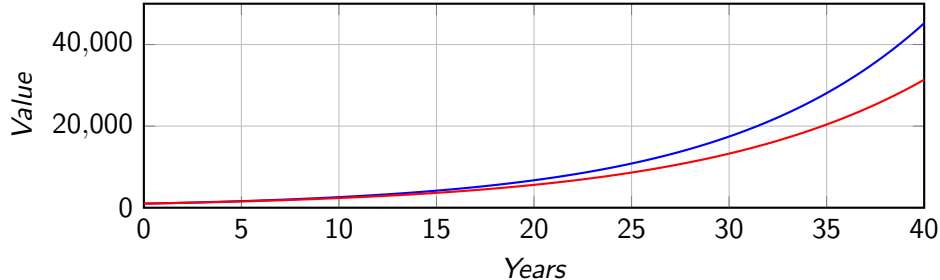
- It would be too much to keep track of $\sim 6,000$ companies' stock at once
- **Index Funds** track the performance of many stocks based on rules set forth when it was created
 - Often track many stocks (500+)
 - Very low fees
 - Easy, simple, and straight forward
- SP500 or total stock market index funds match the performance of the market, have the lowest fees, and are the easiest to set up
 - Good options include VTI, VTSAX, FZROX, FXAIX, and many others

See chapter 7 of freefinancebook.com for more related information.

- **Expense Ratios** are the most common fee and they reduce your annual return by the amount of the expense ratio
- Suppose I have 10% return in a year in an index or mutual fund with a 1% expense ratio, then I have a net return of 9%

$$\begin{aligned}\text{Net Return} &= \text{Nominal Return} - \text{Expense Ratio} \\ &= 10\% - 1\% \\ &= 9\%\end{aligned}$$

- But how important can 1% really be?



- **Blue:** Invest \$1,000 now, average 10% return, no expense ratio

$$\text{Value At 60} = \$1,000 \times (1 + 0.10)^{40} = \$45,259.26$$

- **Red:** Invest \$1,000 now, average 10% return, 1% expense ratio

$$\text{Value At 60} = \$1,000 \times (1 + 0.10 - \underbrace{0.01}_{\text{Fee}})^{40} = \$1,000 \times (1.09)^{40} = \$31,409.42$$

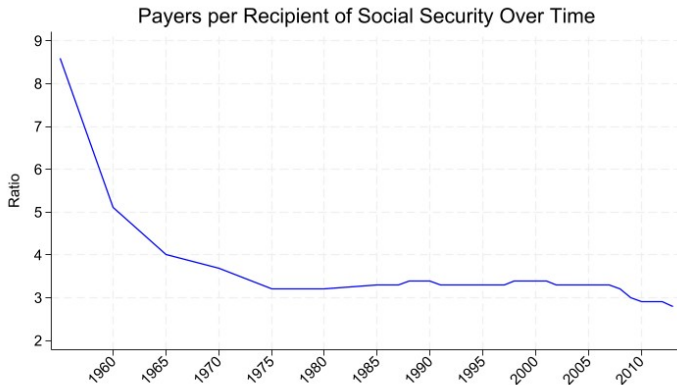
- With no expense ratio, you have ~50% more money when you retire!
- A low expense ratio is $\leq 0.1\%$

Ticker	Name	Expense Ratio
FXAIX	Fidelity 500 Index Fund	0.02%
FSKAX	Fidelity Total Market Index Fund	0.02%
VIIIX	Vanguard Institutional Index Fund Institutional Plus Shares	0.02%
HLIEX	JPMorgan Equity Income Fund	0.45%
ACMVX	American Century Mid Cap Value Fund	0.63%
LSSNX	Loomis Sayles Small Cap Growth Fund	0.82%
MDIJX	MFS International Diversification Fund	0.74%
TRMIX	T. Row Price Mid-Cap Value I	0.72%

- Good options are SP500 or total market index funds with low expense ratios
- Anything different from these are worse

- As you get close to retirement you will want to transition to bonds
- A common strategy is to "invest your age in bonds"
 - Terrible strategy when young, but useful when old
- Target Date Funds do this for you
 - As you get closer to the **Target Date** the fund will automatically change to have more and more bonds
 - No work
 - Low fees ($\sim 0.1\%$)
 - See VTTSX, VLXVX, and VSVNX which "target" 2060, 2065, and 2070, respectively

See chapter 7 of freefinancebook.com for more related information.



- People are living longer and social security is "drying up"
- Do not plan on receiving Social Security or a pension
 - This was an option for our parents, but not us

Per Social Security Administration

- Open a taxable account and invest
 - Similar to a bank account but with higher return
 - Can take your money out whenever and however much you want
 - No protection from taxes
- Open a (Roth) Individual Retirement Account (IRA)
 - You have control over where your money goes
 - Reduce the taxes you pay on gains
 - Limits on withdraws
 - If Roth, you can withdraw your contributions whenever you want
 - Otherwise cannot withdraw until you are 59.5
 - Cannot contribute more than your income
- Open either with Fidelity, Vanguard, or another large company

See chapters 11 and 12 of freefinancebook.com for more related information.

- Avoid taxes, don't evade taxes
- Look into employer-sponsored retirement plans
 - 401k, 457b, 403b
- Consider healthcare related accounts
 - HSA
- Knowing what to do is the *easier* part, but must have the self-control to do it
 - Although I showed everything based on expected returns, *actual* returns vary

See chapters 13-15.5 of freefinancebook.com for more related information.

- Don't count on Social Security or a pension
- Invest as early and often as possible
 - Make this a monthly thing so you are consistent
- Invest passively in total market or target date index funds
 - Active investors lose out over time
- Minimize expense ratios
 - Want below 0.1%
- Avoid (not evade) taxes as much as possible
 - Take advantage of tax shelters such as IRA, 401k, 457b, 403b, and HSA

- Taxes: Income tax, capital gains taxes, and tax avoidance
 - Ch 3, 10, and 22
- Portfolio Management and Tax Shelters: Bonds, IRA, 401k, and HSA
 - Ch 9, 11-13, and 15
- Credit Cards and Credit Scores: Payment floats, annual fees, and buying a house
 - Ch 19-21
- Happiness
 - Ch 24

All chapters are in reference to freefinancebook.com.

- freefinancebook.com: Free and intuitive personal finance book
- JL Collins Stock Series: Casual blog about personal finance
- ChooseFI Podcast: Personal finance podcast