

ECE 09.461

***PROFESSIONALISM &
CONSULTING IN ENGINEERING***

LECTURE 13-14

FINANCIAL LITERACY

DR. ROBI POLIKAR

ELECTRICAL & COMPUTER ENGINEERING

THIS WEEK IN P&C:

FINANCIAL LITERACY

- Quite likely the most important lecture you will ever have
- Your first paycheck
- Financial literacy: what is it, and why is it important?
- Planning for financial well-being:
 - How much do you make?
 - How much do you need? How much can you spend? What is left?
- Setting priorities
- About retirement
 - Saving for retirement – how much do you need? How will you save that much?
 - Retirement calculators /playing with numbers
- Where and how to invest
 - Investment instruments
 - Risk vs. reward
 - Best and worst investment instruments
- Some final thoughts and life advice

FINANCIAL LITERACY


<https://www.investopedia.com/terms/f/financial-literacy.asp>



Financial Literacy

[fə-'nan(t)-shəl 'li-t(ə-)rə-sē]

The ability to understand and effectively use various financial skills, including personal financial management, budgeting, and investing.

 Investopedia



Did you know?

April is financial literacy month

FINANCIAL LITERACY: OVERVIEW

- Remember: financial literacy is the ability to understand and effectively use financial knowledge and skills, including personal financial management, budgeting and investing
- **Financial management:** understand how much you need to earn and spend, how much you can spend, and how to plan for financial emergencies as well as for retirement.
- **Budgeting:** understand your cash flow, how much you are actually earning and spending, and how much you need to save.
- **Investing:** A critical component to be able to save for life's big events: marriage, having kids, buying a house, caring for elders, caring for yourself during retirement, etc.

FINANCIAL LITERACY: IN DETAIL



BUDGETING



INVESTMENT



WEALTH



TAX



RISK MANAGEMENT



EMERGENCY



ACCUMULATION



COLLEGE



STRATEGY



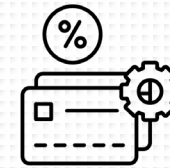
SAVINGS GOAL



ESTATE PLANNING



PLANNING



DEBT MANAGEMENT



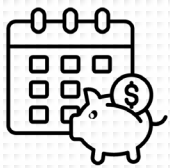
LITERACY



CASH FLOW



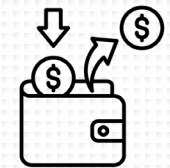
OPPORTUNITIES



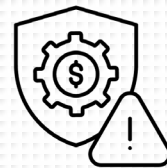
SAVINGS PLAN



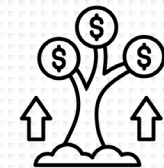
POLICY



CASH FLOW



RISK MITIGATION



WEALTH



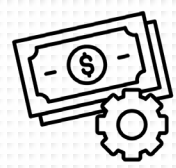
TAX DEDUCTIONS



ASSET



EDUCATION



CASH MANAGEMENT

HOW MUCH DO YOU MAKE?

NO REALLY!

- Numbers on your bank account may be smaller than they appear on your paycheck!
- What is taken from your paycheck before your net pay is deposited?
 - Federal income tax – Most of you will probably be in the 22-24% tax bracket
 - Social security tax – 6.2% from you, 6.2% from your employer (up to \$176K)
 - Medicare tax – 1.45% of your wages
 - NJ income tax – Most of you will probably be in the 6.37% tax bracket
 - NJ unemployment/disability / workforce development/family leave taxes (0.05 – 0.1%)
 - Health insurance premiums (varies greatly)
 - Retirement / 401K plans

TAKE HOME PAY???

For most people, about



**... and even less if you have student loans, child support, alimony, etc.
withdrawn from your paycheck**

HOW ABOUT YOU DR. P.?

- In 2024, of my total gross income → about was withheld for:
 - of taxable income for federal taxes (why is this below 24%?)
 - social security tax (why is this below 6.2%?)
 - health insurance (with my wife)
 - Medicare and Medicare additional tax
 - NJ income and other taxes
 - Retirement savings
 - 403b / 401a / 457
- Net take-home pay:

WHAT ARE YOUR OTHER FIXED EXPENSES?

And from the remaining 40 – 60% of your pay, you need budget for other fixed expenses, such as :

- Housing – Rent, mortgage payment, mortgage insurance, real estate taxes
- Utilities – Electric, Gas, Water, Internet, Cell phone
- Insurance – renter's, homeowner's, auto, etc.
- Food and household expenses
- Gas for car
- Later in life: childcare, school, etc.
- AND – if you have them:
 - Student loans
 - Car loans
 - Credit card debt
 - Alimony / child support



How much do
these cost?

COST OF LIVING IN NEW JERSEY

- Average home value for buying a new home:
 - Assume \$400K, 30 years at 6% → monthly mortgage (not including property taxes)
 - Average property tax: ~ /year (month); homeowner's insurance: \$1500/year
- Average rent: (2 bedroom apartment) renter's insurance/year
- Utility costs (electricity, gas, water, phone, internet, streaming): month
- Groceries: /month (one person, for family)
- Transportation /month (including car insurance)
- Healthcare: (one adult, no children); (family) / year
- Childcare: per year, per child



Let's play with numbers a bit:

- Assume a starting salary of \$80K
 - State and Federal taxes, health insurance, etc.: \$25K
 - Housing and household fixed expenses (rent/mortgage/food/utilities/gas, etc.): \$40K- \$50K
 - Retirement savings: \$5K (not enough!)
- All gone already. And here, we did not even consider any of:
 - Student loans
 - Car loans
 - Credit card debt
 - Entertainment / travel
 - Childcare / school
- Wait, most people make less than \$80K – How is this possible?
- ...And what happens if there is an emergency?

- This is where financial literacy comes into play.
- There are ways to:
 - Decrease your taxes (legally!) → Did you notice Dr. P.'s effective tax rate?
 - **Take advantage of various tax deductions: retirement contributions, child credit, charitable contributions, certain medical expenses, business expenses (for your consulting business), etc.**
 - Decrease your health insurance/car insurance costs
 - Decrease your housing costs (maybe you don't need a very large house!)
 - Increase your income
 - **Spousal income**
 - Two-income is the single most effective way to increase your income, and help reach financial independence...
... so long as you stay together!
 - **Consulting income**
 - Equally effective way, without requiring a spouse
 - **Bonuses**
- If you do these, then you will have money for other things ...
- ...but all of that requires some financial literacy.

LET'S START PLANNING

- How should we plan/spend our money?
- Set priorities
 - Do you have student loans?
 - Credit card debt?
 - Car loan debt?
- Do you have an emergency / rainy day fund?
 - Would you be able to cover a \$10K unexpected expense? Perhaps car repair, or worse, a medical emergency?
 - Are you one financial emergency away from a financial collapse?

1. Emergency fund

- Set aside some amount from every paycheck
- **Q:** How much and how long?
- **A:** Until you have enough to cover you for 6 months (12 is better) → This is the typical amount of economic recovery needed after a major recession and/or the amount of time you need to find a new job in a down economy
- Be most aggressive until you reach a 3-month cushion—preferably within 24 months. Then, get to a 6-month cushion, preferably within 3-4 years, and slowly build up the rest.
- \$80K salary → 3-month cushion: \$20K → Set aside \$800/month for the first two years

2. Pay down your debt – starting with the highest interest

- Credit cards – 20 ~30% ← Get rid of these immediately !!!
- Student loans – 6~10% ← Pay as quickly as you can!

- Why?

- Because paying down a 20% interest debt is equivalent to having an investment with a 20% return!
- There aren't very many investments with that kind of ROI out there!

3. Retirement fund

- Dr. P, you just showed that we have no money left, and you are asking about retirement? How? Why?
- Isn't this something I will consider later when I make more money?

- Assume that you have been working for 40 years, and you are ready to retire.
- Before you retire, you make \$_____
- When you retire, that amount drops to:\$_____

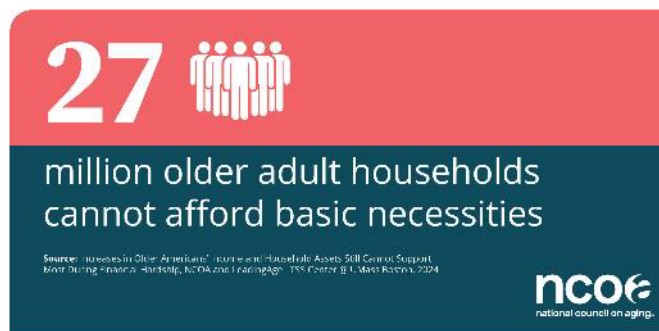
*

* We will talk about social security later

HOW WILL YOU LIVE?

- If you have not put in enough amount while you are working, you will not have enough to live on during retirement.
- How much do you need?
 - Most people need about 80% of their pre-retirement income to be able to maintain their current standard of living
 - For most career engineers, their annual income (in today's dollars) before retirement is about \$200K
 - The highest social security pays is about \$3K/month → \$36K/year (but there is no guarantee that it will still be there in 40 years!)
 - If you have no retirement savings, you simply will not be able to retire

- ...and this is the unfortunate reality of Americans today:
 - ~48% of working Americans do not have access to a retirement plan
 - ~23% of US adults over the age of 65 are still employed fulltime
 - ~80% of households with older adults are either financially struggling or at risk of becoming economically insecure
 - According to Yahoo Finance, 45% of American households are expected to run out of money in retirement if they stop working at age 65.



Plan early and accordingly, so that you do not become part of this statistic!

So, You MUST SAVE FOR RETIREMENT

- Back to our example:
- You want to retire at the age of 65, with then-current income of \$200K
 - Assume you need 80% to maintain your lifestyle →
 - Assume you get from social security → Still need /year
 - How long will you live? Let's say another years (typical)

HOW TO SAVE




- To save  over a 40-year long income earning period, by a simple math, you need to save:

□



HOW IS THAT POSSIBLE???

- That is over  year → That's almost my entire starting salary!
- Saving that amount seems impossible!

IT IS POSSIBLE, BUT...

- ... it requires meticulous planning
- ... unwavering and disciplined savings
- ... painstaking patience
- ... exceptional understanding of the markets and compounded growth
- ... being abreast of – and taking (legal!) advantage of – tax laws
- ... nerves of steel to ride market fluctuations
- ... and most importantly, it requires

Living within your means

Do this on day one when you start working:

- Go to your company HR / Benefits Coordinator, and set aside the minimum required to maximize the company match

This is

\$\$\$ FREE MONEY! \$\$\$

The return of investment on the company match is



2. Add as much as possible to that amount until you reach the federal limit for the maximum amount you can contribute to a company-sponsored retirement plan (401K)

- For 2025, that limit is
- Each year, that contribution limit goes up a bit
- When you are over 50, you can contribute an additional

3. Reduce your taxes!!!

- 401K contributions are tax-deferred
- The amount you contribute is deducted from your income, as if you have never earned it, and hence reduces your taxable income!
- If you are in the 24% tax bracket, this is equivalent to Uncle Sam giving you a 24% discount on your taxes! That, too, is free money!
- For a \$10,000 contribution, you reduce your taxes by , which increases your take-home pay.

4. Contribute to an IRA / Roth-IRA plan

- You can contribute up to a year to an IRA / Roth-IRA plan
- The limit is if you are over 50
- That limit also goes up a bit every year.

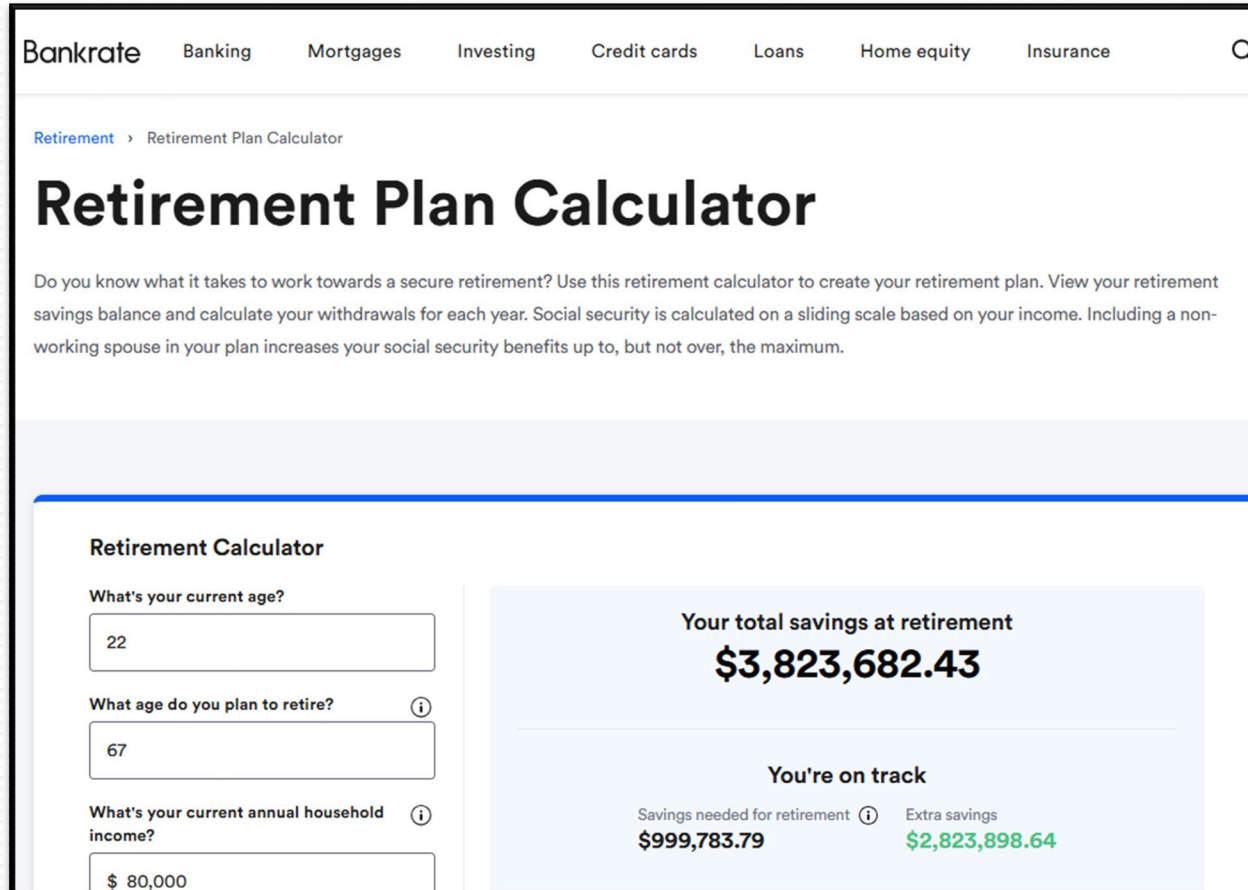
- ... that is all well and good, but how will I ever get to saving \$6K/month to get to \$3M by the time I retire?

YOU DON'T HAVE TO!

- That is the beauty of compounded earnings and the power of time!

LET'S ASK SOME RETIREMENT CALCULATORS

- <https://www.bankrate.com/retirement/retirement-plan-calculator/>



The screenshot shows the Bankrate Retirement Plan Calculator interface. At the top, there's a navigation bar with links for Banking, Mortgages, Investing, Credit cards, Loans, Home equity, and Insurance. Below this, the page title "Retirement Plan Calculator" is displayed. A brief description explains the calculator's purpose: to help users create a retirement plan by viewing their savings balance and calculating annual withdrawals, including social security benefits based on income and a non-working spouse. The main input section on the left asks for the user's current age (22), planned retirement age (67), and current annual household income (\$80,000). On the right, a large blue box displays the "Your total savings at retirement" as \$3,823,682.43. Below this, a "You're on track" message is shown, comparing the "Savings needed for retirement" (\$999,783.79) with "Extra savings" (\$2,823,898.64).

Bankrate Banking Mortgages Investing Credit cards Loans Home equity Insurance

Retirement > Retirement Plan Calculator

Retirement Plan Calculator

Do you know what it takes to work towards a secure retirement? Use this retirement calculator to create your retirement plan. View your retirement savings balance and calculate your withdrawals for each year. Social security is calculated on a sliding scale based on your income. Including a non-working spouse in your plan increases your social security benefits up to, but not over, the maximum.

Retirement Calculator

What's your current age?

22

What age do you plan to retire?

67

What's your current annual household income?

\$ 80,000

Your total savings at retirement

\$3,823,682.43

You're on track

Savings needed for retirement **\$999,783.79** Extra savings **\$2,823,898.64**

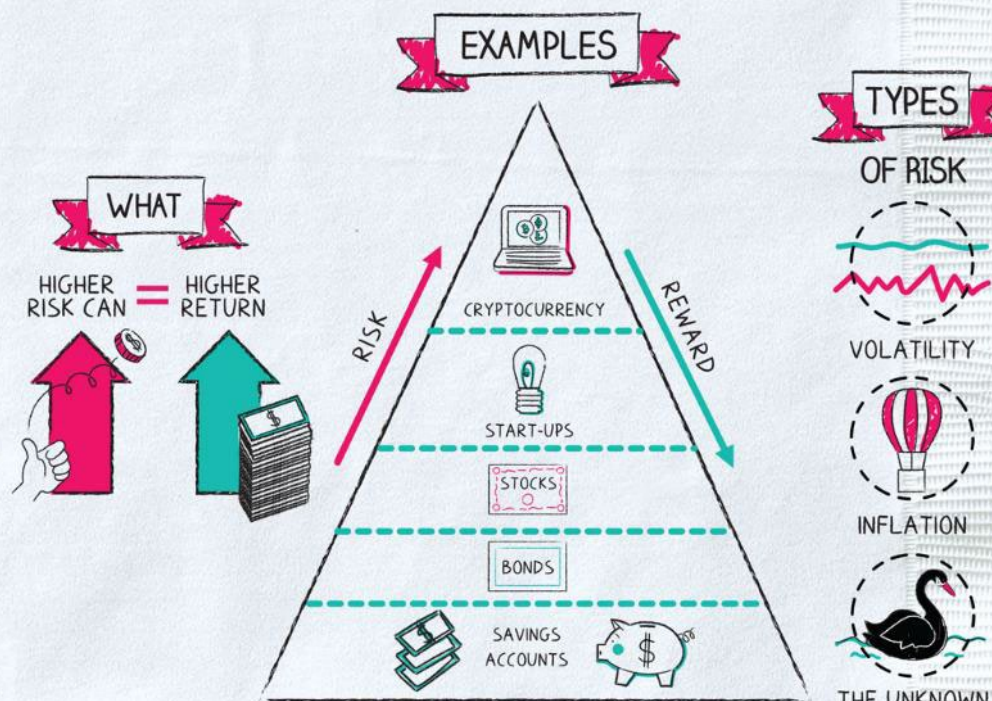
- There is no shortage of financial calculators – retirement calculators, savings calculators, compounded interest calculators, salary increase calculators, etc.
- They each make different assumptions, so try several different ones.
- Bottom line: Start small – but as much as you can; then increase it as much as you can.
 - Every time you get a salary increase, a bonus, a windfall → Add it to your retirement accounts.
 - Increase your contributions over time.

- While you should not be getting married for this reason alone...
 - Having an income-generating spouse dramatically increases your chances of reaching your financial goals
 - The federal government rewards being married and filing jointly with special tax limits, incentives, and brackets
 - Having a second income allows you to save more after paying all your bills.
 - **Most of your living expenses are fixed and do not increase (much) with a second person in the house; but the second person's income can add significant funds!**
- But, choose your spouse wisely!
- Discuss and plan financial goals together

WHERE TO INVEST?

- Bank savings / online accounts
- Treasury bills/government bonds
- Commodities (gold, energy, corn, lithium, etc.)
- Bond market
- Stock market / common stocks
- Mutual funds / exchange traded funds (ETFs)
- Money markets
- Options
- Currency hedging
- Cryptocurrency / Bitcoin
- Art collection
- Real estate

RISK VS. REWARD



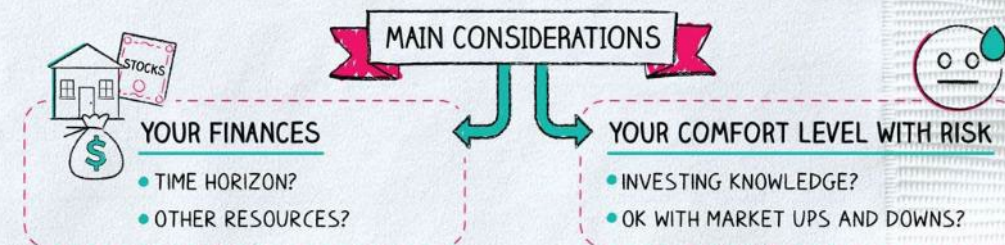
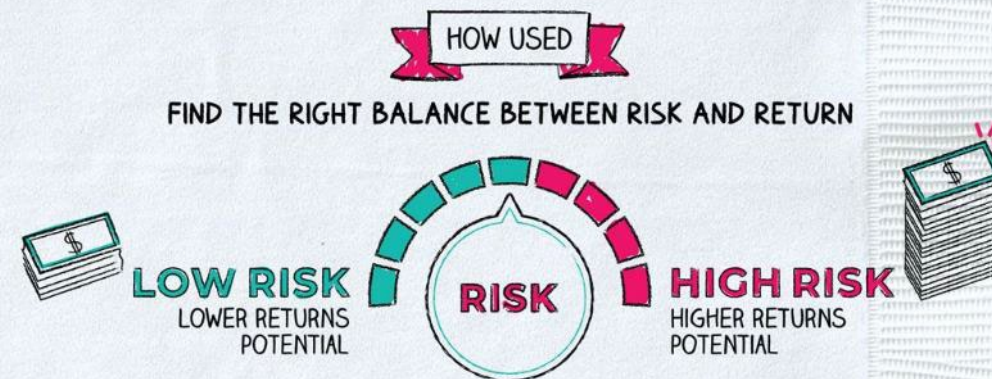
CAUTION
INVESTING ALWAYS COMES WITH RISK!

Napkin Finance

<https://napkinfinance.com/napkin/risk-vs-reward/>

R!SK TOLERANCE

HOW MUCH INVESTING RISK SHOULD YOU TAKE ON?



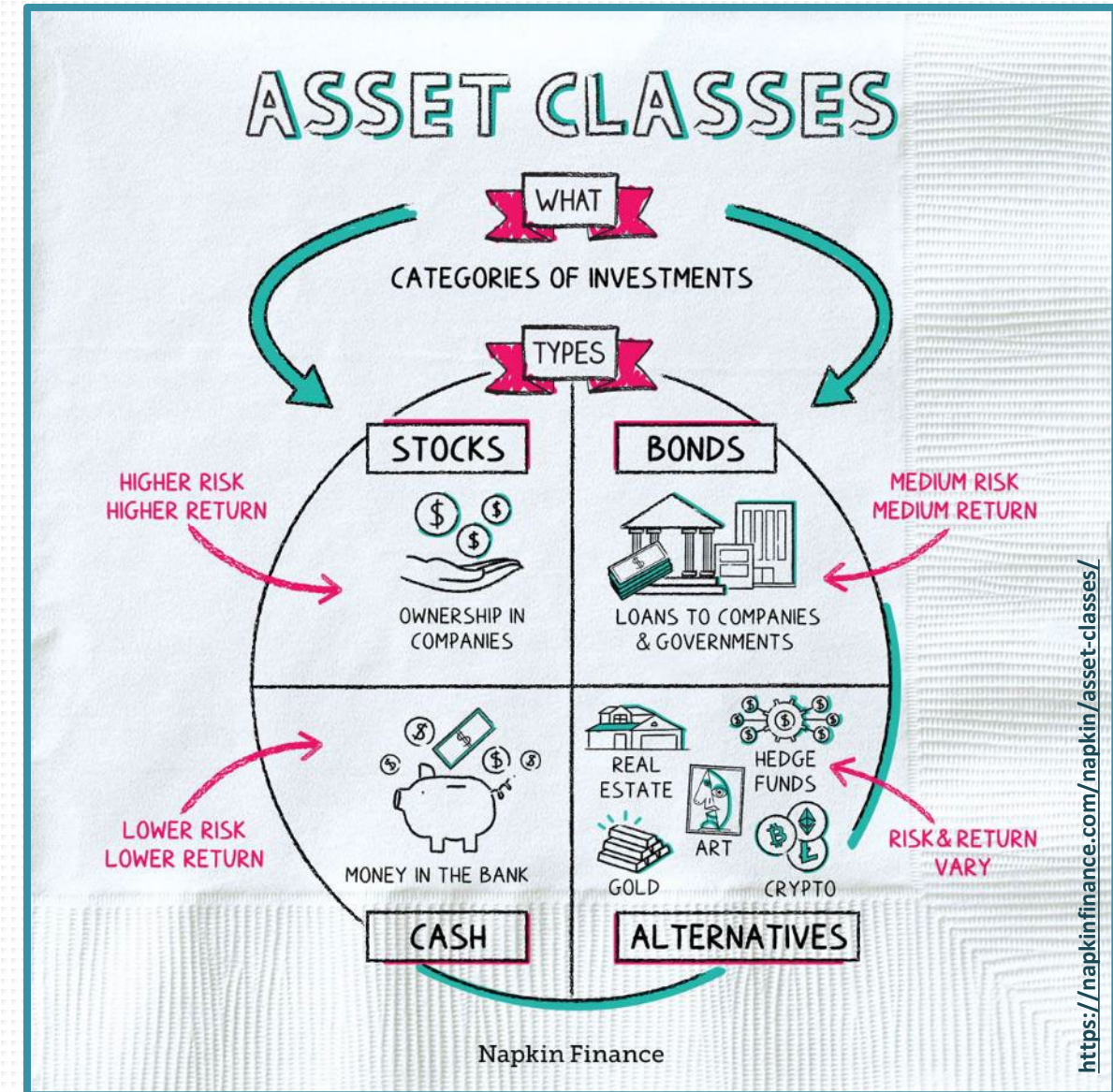
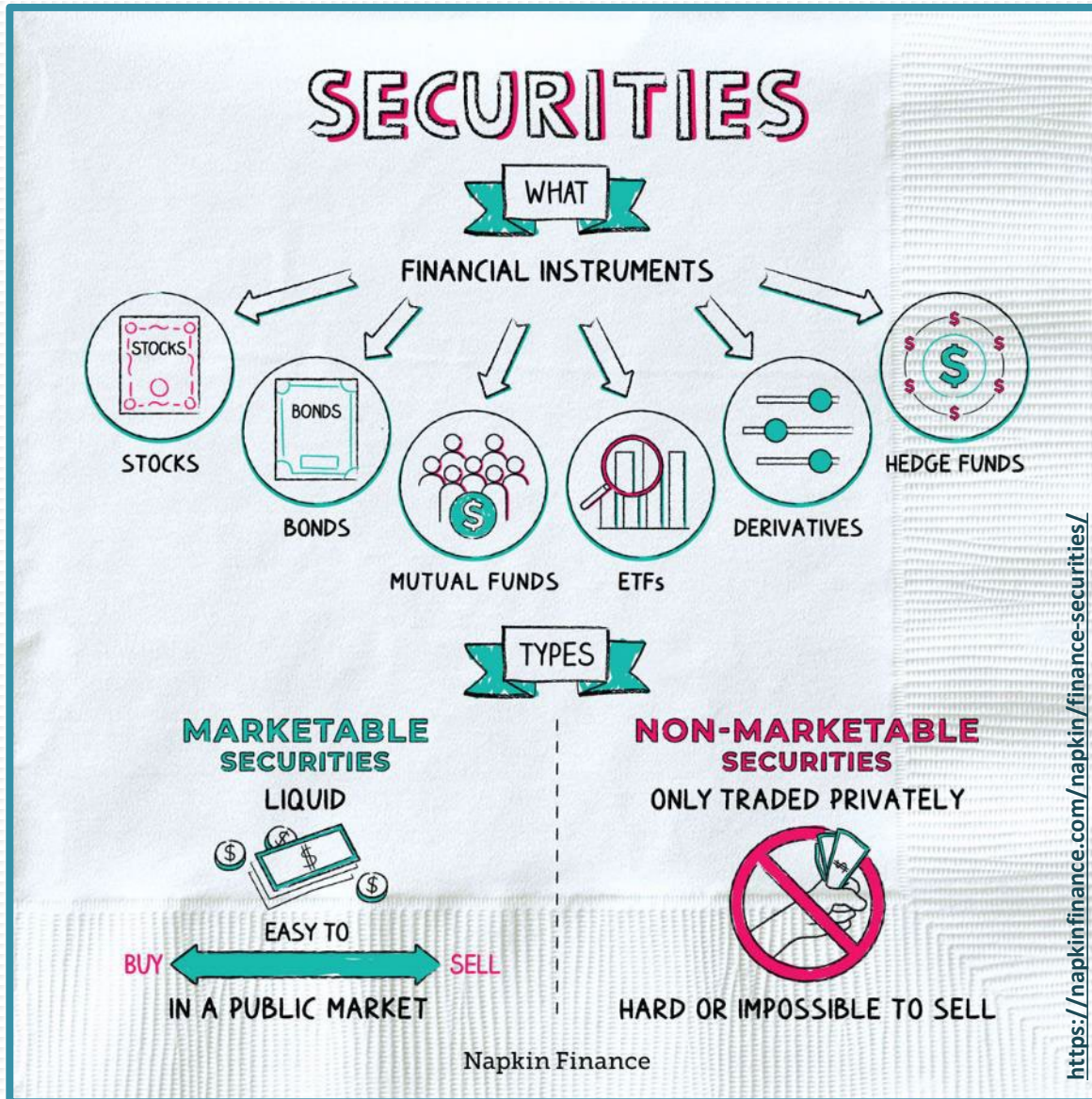
WHY IMPORTANT



Napkin Finance

<https://napkinfinance.com/napkin/risk-tolerance/>

ASSETS & SECURITIES




LOW RISK, LOW RETURN

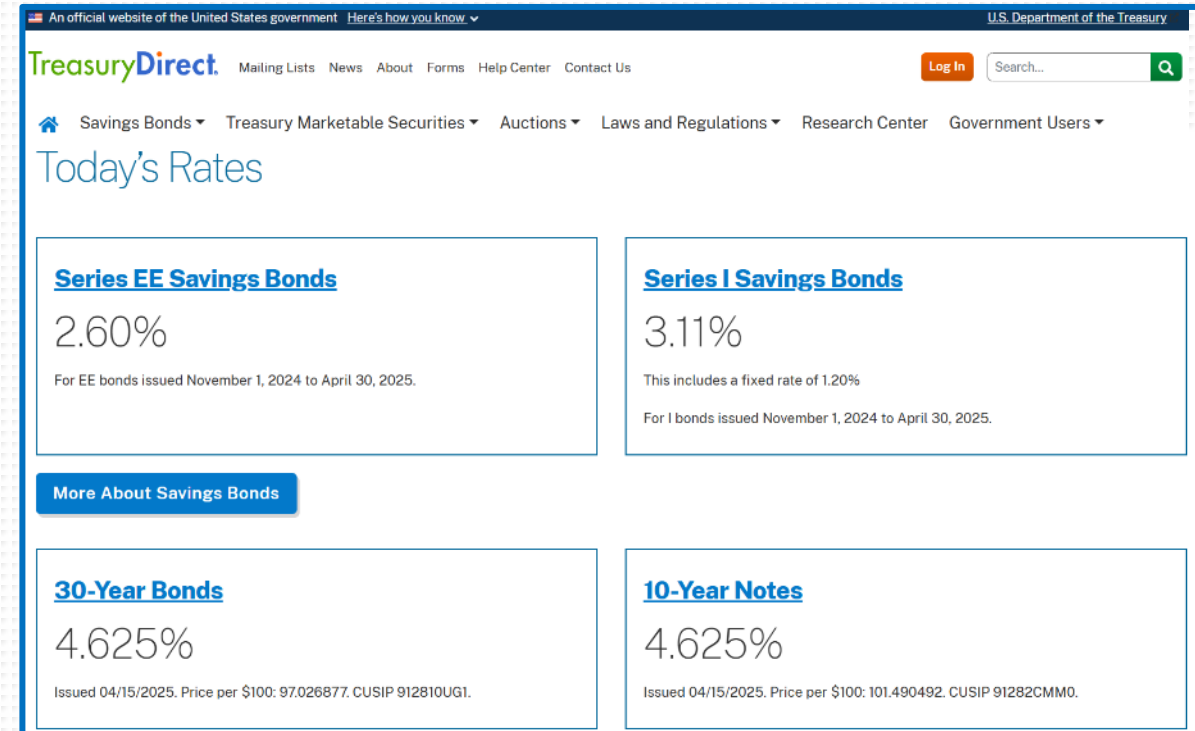
- **Bank / online savings / CD accounts** → interest-bearing bank accounts, FDIC-insured, and your principal is guaranteed + an interest, but usually below inflation. CDs have slightly higher interest, but also a penalty if withdrawn before maturity.
- **U.S. Treasury securities** → Earnings are exempt from local / state taxes
 - **T-Bills:** short-term securities with a certain face value. You buy them at a discount and receive the face value at maturity (4 – 52 weeks). No other interest is paid.
 - **T-Notes:** Intermediate-term securities that pay a fixed interest every six months until maturity (2 – 10 years). Longer-term → moderate interest rate risk.
 - **T-Bonds:** Long-term securities that pay a (higher) fixed interest rate every six months until maturity (20-30 years). Long-term → high interest rate risk
 - **U.S. Saving Bonds: Series EE Bonds** earn a fixed interest rate that is guaranteed to double the principal in 20 years. **Series I Bonds** earn a fixed+variable interest adjusted every 6-months and protects against inflation. Interest is paid every 6-months. Savings bonds can be free of federal taxes if earnings are used for educational purposes. Both series earn interest until maturity (30 years), but they can be redeemed after 1/5 year (with/without penalty).

Bank online accounts: Around 3.6~4% APY (annual percentage yield)
CDs: Around 4% (12 months); 3.5% (24 -48months); 4.15% (60 months)

	Treasury Bills	Treasury Notes	Treasury Bonds
Maturity	Up to one year	Two, three, five, seven, or 10 years	20 or 30 years
Interest Payments/Coupons	None	Every six months	Every 6 months
Pricing	Sold at a discount	Sold at par, premium, or discount	Sold at par, premium, or discount
Liquidity	High	High	Relatively lower
Interest Rate Risk	Low	Moderate	High
Current Yields	3-Month T-Bills 4.403%	5-Year Treasurys 4.277%	30-Year Treasurys 4.606%
		10-Year Treasurys 4.414%	

Table: Investopedia/Peter Gratton • Source: [U.S. Department of the Treasury](https://www.treasurydirect.gov/) • Created with [Datawrapper](https://datawrapper.info/)  Investopedia

<https://www.investopedia.com/ask/answers/difference-between-bills-notes-and-bonds>



The screenshot shows the TreasuryDirect website with the following rates:

- Series EE Savings Bonds:** 2.60% (For EE bonds issued November 1, 2024 to April 30, 2025.)
- Series I Savings Bonds:** 3.11% (This includes a fixed rate of 1.20%. For I bonds issued November 1, 2024 to April 30, 2025.)
- 30-Year Bonds:** 4.625% (Issued 04/15/2025. Price per \$100: 97.026877. CUSIP 912810UG1.)
- 10-Year Notes:** 4.625% (Issued 04/15/2025. Price per \$100: 101.490492. CUSIP 91282CMM0.)

<https://www.treasurydirect.gov>

Click on the boxes or the links for updated rates / information

- **Commodities (agricultural, metals, energy):** you buy the commodity in the open market ([see current prices](#)) , may fluctuate wildly.
- **Bond market:** IOUs issued by government or companies. Generally, lower fluctuations → lower risk but lower return than the stock market. High yield(junk) bonds, however, have higher risk/return profile
- **Stock market / common stocks:** you own a share of a company purchased on the open market. You make money if the company's stock price goes up and/or the company pays dividends.
- **Mutual funds/exchange-traded funds (ETFs):** A group of stocks jointly owned by a group of investors. Reduces risk through diversification.

WHERE TO INVEST?

HIGHER RISK, HIGHER RETURN

Market Summary > Apple Inc

209.28 USD

+137.01 (189.58%) ↑ past 5 years

Closed: Apr 25, 7:59 PM EDT • Disclaimer
After hours 208.59 -0.69 (0.33%)

+ Follow

1D

5D

1M

Market Summary > Walt Disney Co

90.28 USD

-15.22 (-14.43%) ↓ past 5 years

Closed: Apr 25, 7:01 PM EDT • Disclaimer
After hours 90.26 -0.020 (0.022%)

+ Follow

1D

5D

1M

6M

YTD

1Y

5Y

Max

50

200

2021

110.38 USD Feb 14, 2025

Market Summary > Vanguard Total Stock Market Index Fund Admiral Shares

131.81 USD

+62.82 (91.06%) ↑ past 5 years

Apr 25 • Disclaimer

+ Follow

5D

1M

6M

YTD

1Y

5Y

Max

60

100

120

140

160

2021

2022

2023

2024

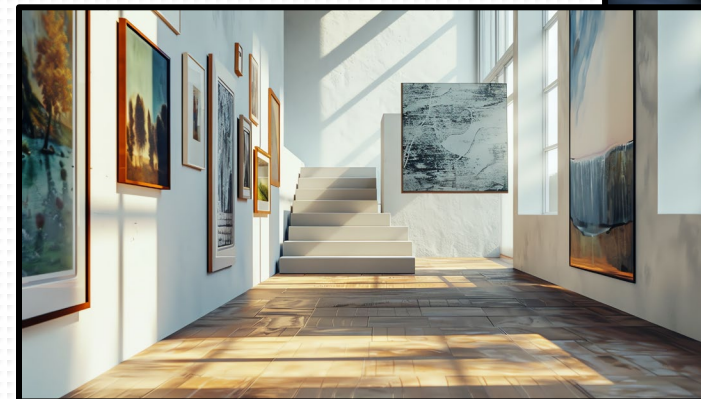
2025

131.81 USD Apr 25, 2025

WHERE TO INVEST?

SPECULATIVE / HIGHLY RISKY

- **Options:** contracts that give the buyer the right, but not the obligation, to buy or sell a security at a specified price within a specific time frame. Generally used to bet against the market/company. **Highly risky!**
- **Cryptocurrency (bitcoins):** a digital and decentralized currency market that operates outside of a central bank or a single regulator. Limited number of bitcoins (21M) makes it a scarce asset, whose value can fluctuate wildly. **Highly risky!**
- **Currency hedging:** You buy / sell foreign currency, hoping its value will change favorably against another currency (e.g. USD). **Highly risky!**
- **Art collection:** You buy a piece of art in hopes that the artist will become very famous, and his/her work gain value. **Highly risky!**
- **Real estate:** You buy a piece of real estate. You make money by either renting it or by selling it in the future, presumably at a higher value.



WORST FORMS OF INVESTMENTS

1. No investment

- Self-explanatory!

2. Any investment tool that you do not fully understand!

- Unfortunately, most people think they understand what they are investing in, but in reality, do not quite comprehend the reward–risk spectrum.

3. Speculative investment tools

- Options, cryptocurrency, certain commodities, penny stocks

4. Interest-bearing bank accounts

- You should use bank accounts for your emergency fund (immediately liquid), but they are not good for long-term, high-return investment

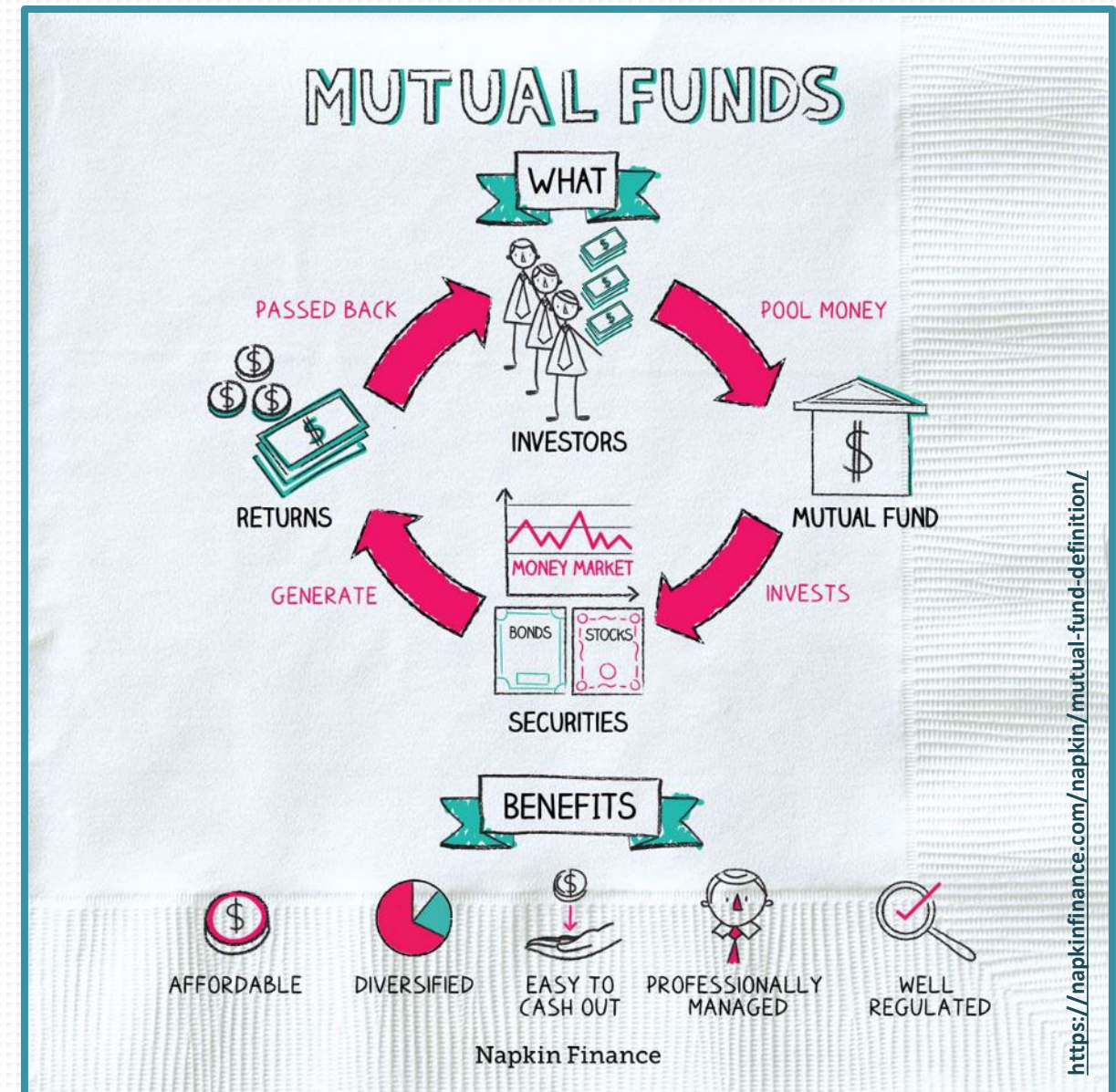
DIVERSIFICATION

- Since there are so many forms of investment, and each has different risk-reward characteristics, how do we know where to invest?
- **Diversification**: An asset allocation strategy, where you place different amounts of your assets in different investment “baskets” based on your financial goals and risk tolerance.
 - Put some of your assets in low-risk, low-return investments, some in medium-risk investments, and some in high-risk, high-return investments
 - The most common asset allocation consists of stocks, bonds, and cash
 - ...but each of these has multiple subcategories. For example, there are large cap, mid cap, small cap, domestic, international, sector-specific companies and funds; there are government and municipal, high grade and low grade (junk) bonds, etc.



BEST FORM OF INVESTMENT

- If you do not know much about investing (and you don't!), stick to a few simple mutual funds.
- A mutual fund is a collection of stocks or bonds (i.e., securities), picked by an investment company/professional based on set criteria
 - Small/mid-size/large company stocks
 - Domestic vs. international stocks
 - Industry-specific stocks: energy, financial markets, technology, healthcare, AI, etc.
 - Investment grade vs. high return vs. government vs. municipal bonds
 - Funds of funds
 - Actively managed vs. index funds, target-date funds
 - Exchange-traded funds (a slightly different form of mutual funds)



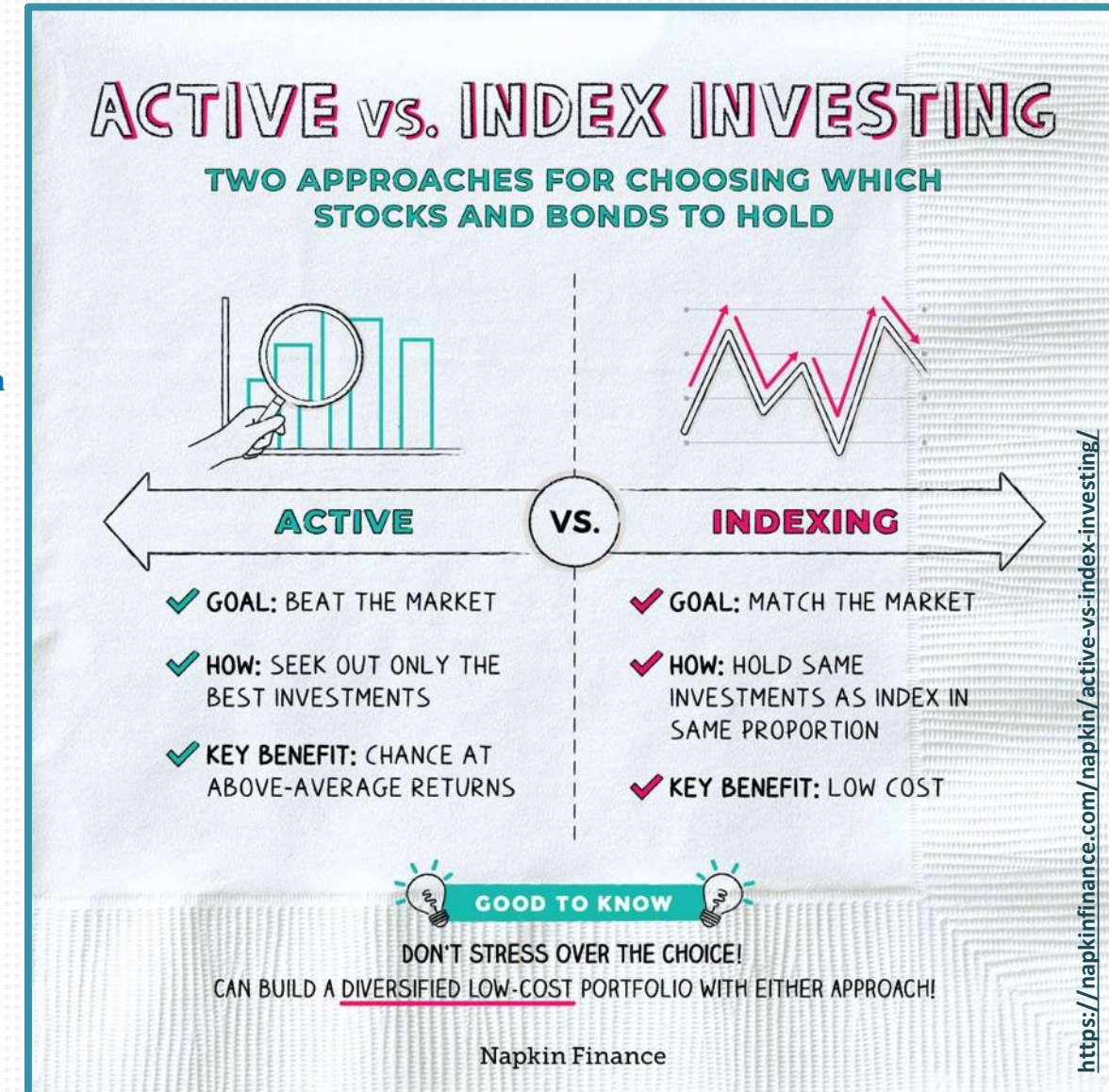
- How do I get one?

- Your employer 401K/403b plan most likely offers a menu of these, and/or
 - Choose from many financial companies*, such as Vanguard, Charles Schwab, Fidelity, among others.
 - Go to their site and read about their products
 - Pay attention to expense ratios, risk vs. reward charts, investment criteria and priorities, current holdings, past performance (which cannot guarantee future performance), turn over ratio, etc.

- Active vs. passive investing and expense ratios

- Active mutual funds have professional analysts who study companies and actively make buy/sell decisions. Therefore, active funds → higher expense ratios.
 - Passive (aka index) mutual funds simply replicate the market based on their investment criteria: e.g., a large-cap index fund buys the stocks of all large companies in the ratio of their market value. No analyst is involved; therefore, passive index funds → lower expense ratios.
 - Over long periods, index funds typically outperform active funds!

MUTUAL FUNDS



* This list is for illustration purposes only. Inclusion or omission of a fund company does not imply endorsement or lack thereof it. Do your own research to decide which company and which specific funds you want to invest in.

INVESTMENT STYLES

FOR MUTUAL FUNDS

EQUITY				
Level of Risk	Value	Blend	Growth	Average Market Capitalization
Low	Large-Cap Value	Large-Cap Blend	Large-Cap Growth	Large
Moderate	Mid-Cap Value	Mid-Cap Blend	Mid-Cap Growth	Medium
High	Small-Cap Value	Small-Cap Blend	Small-Cap Growth	Small

<https://jemmafinancial.com/financial-glossary/what-is-the-morningstar-style-box>

FIXED INCOME				
Level of Risk	Short	Intermediate	Long	Credit Quality
Low	High Short	High Inter.	High Long	High
Moderate	Med. Short	Med. Inter.	Med. Long	Medium
High	Low Short	Low Inter.	Low Long	Low

Vanguard 500 Index Admiral VFIAX ★★★★★ Morningstar Medalist Rating				
Portfolio Medalist Rating as of Jan 27, 2025 See Vanguard Investment Hub				
Quote Chart Fund Analysis Performance Sustainability Risk Price Portfolio People Parent				
Portfolio				
Asset Allocation				
Asset Class	Net	Short	Long	Cat. Index
U.S. Equity	99.52	0.00	99.52	96.32 99.26
Non-U.S. Equity	0.52	0.00	0.52	2.18 0.74
Fixed Income	0.00	0.00	0.00	0.66 0.00
Other	0.00	0.00	0.00	1.04 0.00
Cash	-0.04	0.12	0.08	1.67 0.00
Not Classified	0.00	0.00	0.00	0.03 0.00
Stock Style				
	Value	Blend	Growth	Weight %
Large	20	43	19	50+ 25-49 10-24 0-9
Medium	6	9	3	
Small	0	0	0	
Investment as of Mar 31, 2025 Category: Large Blend as of Mar 31, 2025 Index: Morningstar US Large-Mid TR USD as of Mar 31, 2025 Source: Holdings-based calculations.				

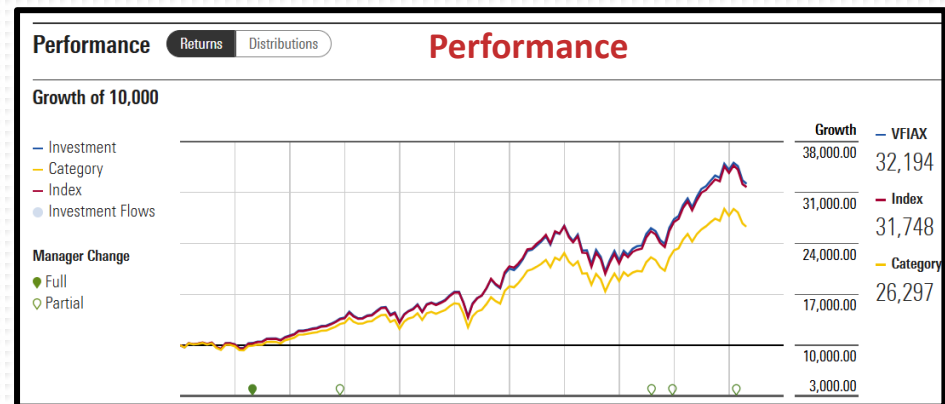
<https://www.morningstar.com/funds/xnas/vfiac/portfolio>

Top 10 holdings

Holdings	% Portfolio Weight	First Bought	Market Value as of Mar 31, 2025	Cur	Share Change %	1-Year Return	Forward P/E
Apple Inc	7.03	Jun 30, 1984	92,739,035,100	USD	↓ 0.41	23.77	28.57
Microsoft Corp	5.88	May 31, 1994	77,559,585,418	USD	↑ 0.20	-1.01	26.18
NVIDIA Corp	5.59	Dec 31, 2001	73,767,864,210	USD	↑ 0.05	34.39	25.38
Amazon.com Inc	3.78	Dec 31, 2005	49,875,327,751	USD	↑ 1.00	8.82	28.57
Meta Platforms Inc Class A	2.66	Dec 31, 2013	35,079,646,509	USD	↑ 0.67	24.45	21.51
Berkshire Hathaway Inc Class B	2.06	Mar 31, 2010	27,130,776,105	USD	↑ 0.21	31.13	26.53
Alphabet Inc Class A	1.90	Mar 31, 2006	25,069,764,839	USD	↑ 0.04	4.33	18.02
Broadcom Inc	1.65	Apr 30, 2018	21,811,970,374	USD	↑ 0.57	50.30	29.41
Alphabet Inc Class C	1.56	Oct 31, 2015	20,525,954,060	USD	↓ 0.46	4.24	18.21
Tesla Inc	1.53	Dec 31, 2020	20,156,144,898	USD	↑ 0.42	67.44	129.87

Sector exposure

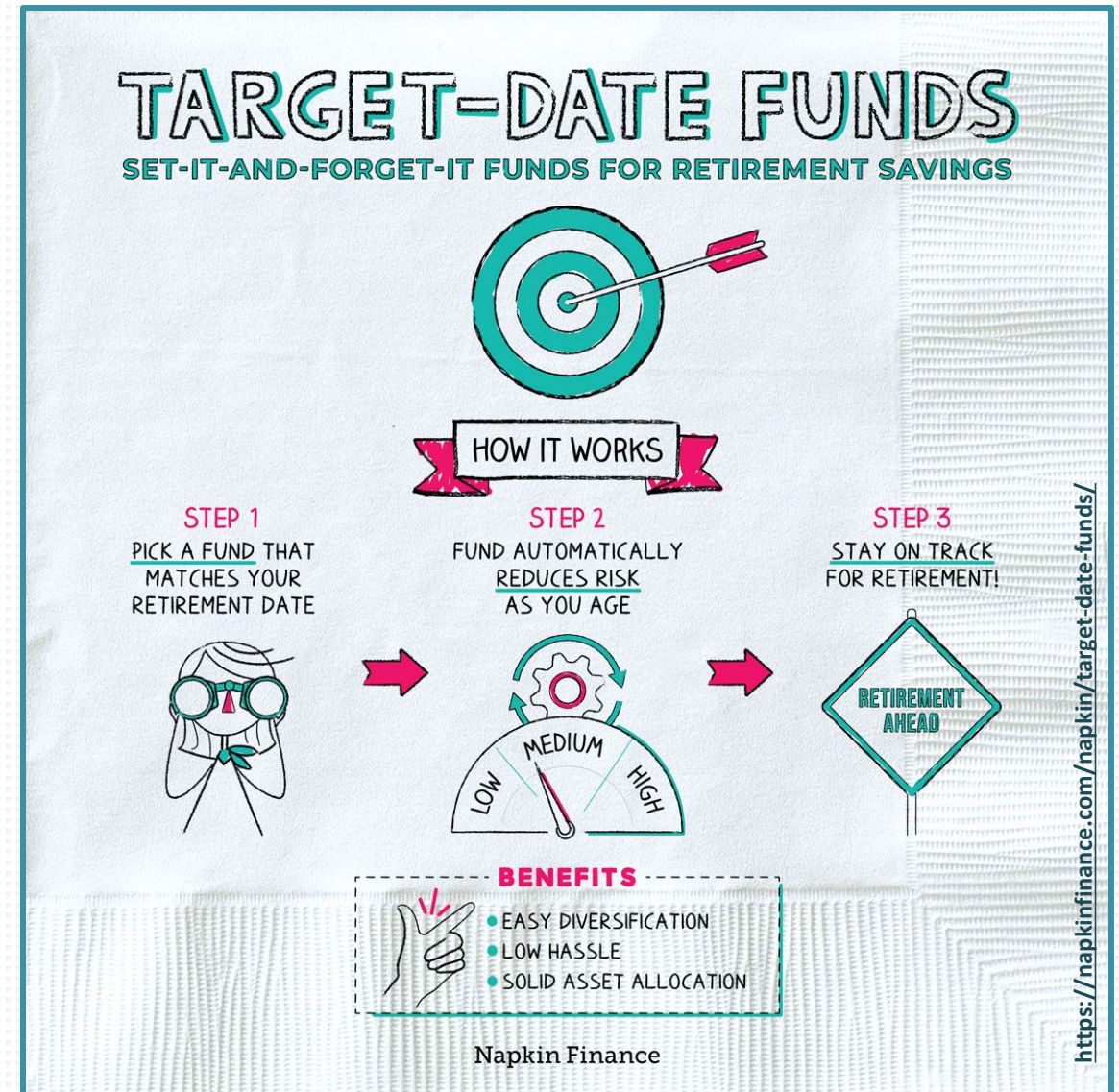
Exposure	Sector	Region	Country	vs. Category %
Sectors				
	Investment %	Cat %		
Cyclical				
Basic Materials	1.79	2.20		
Consumer Cyclical	10.36	10.43		
Financial Services	14.15	14.71		
Real Estate	2.26	1.91		
Sensitive				
Communication Services	9.34	8.81		
Energy	3.66	3.41		
Industrials	7.45	9.30		
Technology	31.03	29.48		
Defensive				
Consumer Defensive	6.03	5.77		
Healthcare	11.20	11.45		
Utilities	2.72	2.52		



Holdings			
Equity Holdings	Bond Holdings	Other Holdings	
505	0	2	
% Assets in Top 10 Holdings	Reported Turnover %	Women Directors %	Women Executives %
34	2.00	35	27
As of 12/31/24			

SIMPLEST FORM OF INVESTING

- Target date funds – Balanced funds (mix of stocks and bonds)
 - Change the composition of a fund of funds based on how close the date is to the target date.
 - A fund with a target date over 10 years (or more away) will have most of its holdings in high-risk high-return stocks
 - A fund with a target date within 5 years will have increasingly more bonds and fewer stocks
 - As the target date gets closer, the fund becomes more conservative and less risky (because you have less time to recover from a bad market).



AN EXAMPLE

A 2040 FUND

Vanguard Target Retirement 2040 Fund VFORX★★★★Morningstar Medalist Rating

Medalist Rating as of Mar 5, 2025 | See Vanguard Investment Hub >

Quote

Chart

Fund Analysis

Performance

Sustainability

Risk

Price

Portfolio

People

Parent

NAV / 1-Day Return
43.19 / +0.37%

Total Assets
91.1 Bil

Adj. Expense Ratio ⓘ
0.080%

Expense Ratio
0.000

Distribution Fee Level
Low

Share Class Type
No Load

Category
Target-Date 2040

Investment Style
Large Blend

Credit Quality / Interest
Rate Sensitivity
High/Moderate

Status
Open

TTM Yield
2.44%

Turnover
2%

https://www.morningstar.com/funds/xnas/vforx/quote

Vanguard Target Retirement 2040 Fund VFORX★★★★Morningstar Medalist Rating

Portfolio | Medalist Rating as of Mar 5, 2025 | See Vanguard Investment Hub >

Quote

Chart

Fund Analysis

Performance

Sustainability

Risk

Price

Portfolio

People

Parent

Portfolio

Equity

Bond

Asset Allocation

Asset Class	Net	Short	Long	Cat.	Index
U.S. Equity	43.86	0.00	43.86	47.78	50.41
Non-U.S. Equity	29.39	0.00	29.39	22.74	26.02
Fixed Income	25.08	0.01	25.08	14.10	22.95
Other	0.05	0.00	0.05	14.95	0.62
Cash	1.60	5.62	7.22	2.77	0.00
Not Classified	0.02	0.00	0.02	0.08	0.00

Investment as of Mar 31, 2025 | Category: Target-Date 2040 as of Mar 31, 2025 | Index: Morningstar Lifetime Mod 2040 TR USD as of Mar 31, 2025 | Source: Holdings-based calculations.

Stock Style

Map

Weight

Historical

Val

Bld

Gwth

Centroid

Ownership Zone

Vanguard Target Retirement 2040 Fund as of 03/31/2025

Target-Date 2040 as of 03/31/2025

Morningstar Lifetime Mod 2040 TR USD as of 03/31/2025

Market Cap

Avg Market Cap	Category Avg Market Cap	Index Avg Market Cap
96.84 Bil	116.70 Bil	79.27 Bil

USD | As of Mar 31, 2025 | Category: Target-Date 2040 | Index: Morningstar Lifetime Mod 2040 TR USD | Data is based on the long position of the equity holdings.

Measures

Value & Growth Measures	Investment	Cat. Average	Index
Price/Earnings	16.81	17.55	17.13
Price/Book	2.41	2.69	2.42
Price/Sales	1.81	2.01	1.81
Price/Cash Flow	10.62	11.26	10.68
Dividend Yield %	2.22	2.06	2.24
Long-Term Earnings %	10.12	10.25	10.11
Historical Earnings %	6.25	4.67	5.73
Sales Growth %	5.36	6.45	-0.44
Cash-Flow Growth %	5.18	20.54	3.99
Book-Value Growth %	6.27	2.85	5.61

Vanguard Target Retirement 2040 Fund VFORX★★★★Morningstar Medalist Rating

Portfolio | Medalist Rating as of Mar 5, 2025 | See Vanguard Investment Hub >

Quote

Chart

Fund Analysis

Performance

Sustainability

Risk

Price

Portfolio

People

Parent

Portfolio

Equity

Bond

Asset Allocation

Asset Class	Net	Short	Long	Cat.	Index
U.S. Equity	43.86	0.00	43.86	47.78	50.41
Non-U.S. Equity	29.39	0.00	29.39	22.74	26.02
Fixed Income	25.08	0.01	25.08	14.10	22.95
Other	0.05	0.00	0.05	14.95	0.62
Cash	1.60	5.62	7.22	2.77	0.00
Not Classified	0.02	0.00	0.02	0.08	0.00

Investment as of Mar 31, 2025 | Category: Target-Date 2040 as of Mar 31, 2025 | Index: Morningstar Lifetime Mod 2040 TR USD as of Mar 31, 2025 | Source: Holdings-based calculations.

Fixed Income Style

Current

Historical

Ltd

Mod

Ext

High

Mid

Low

Fixed Income Measures

Investment

Category Average

Effective Duration

6.19

7.02

Modified Duration

—

—

Effective Maturity

8.42

10.67

Avg Credit Rating (surveyed)

AA

AA-

Weighted Coupon

3.37

4.04

Weighted Price

93.63

—

Yield to Maturity

4.70

4.89

As of Mar 31, 2025 | Category: Target-Date 2040 | Source: Manager-reported and holdings-based calculations.

Exposure

vs. Category %

Sectors

Investment %

Cat %

Government

46.44

34.30

Municipal

0.26

0.22

Corporate

17.71

23.64

Securitized

13.23

24.67

Cash & Equivalents

6.25

14.38

Derivative

16.11

2.79

As of Mar 31, 2025 | Category: Target-Date 2040 | Sector data is based on the rescaled long position of the holdings. | Source: Holdings-based calculations.

Bond Breakdown

Credit Quality

vs. Category %

Grades

Investment %

Cat %

AAA

58.23

22.37

AA

9.93

44.49

A

16.29

12.56

BBB

14.44

14.91

BB

0.00

2.63

B

0.00

1.02

Below B

0.00

0.43

Not Rated

1.11

1.58

As of Mar 31, 2025 | Category: Target-Date 2040 | Credit Quality Data is based on the long position of the holdings. | Source: Manager-reported.

AN EXAMPLE A 2025 FUND

Schwab Target 2025 SWHRX ★★★★★ Morningstar Medalist Rating

Medalist Rating as of Jan 31, 2025 | [See Charles Schwab Investment Hub](#) >

[Quote](#) [Chart](#) [Fund Analysis](#) [Performance](#) [Sustainability](#) [Risk](#) [Price](#) [Portfolio](#) [People](#) [Parent](#)

NAV / 1-Day Return 14.40 / +0.35%	Total Assets 407.2 Mil	Adj. Expense Ratio ⓘ 0.320%	Expense Ratio 0.000	Distribution Fee Level Low	Share Class Type No Load
Category Target-Date 2025	Investment Style Large Blend	Credit Quality / Interest Rate Sensitivity Medium/Moderate	Status Open	TTM Yield 3.01%	Turnover 12%

<https://www.morningstar.com/funds/xnas/swhrx/quote>

Schwab Target 2025 SWHRX ★★★★★ Morningstar Medalist Rating

Portfolio | Medalist Rating as of Jan 31, 2025 | [See Charles Schwab Investment Hub](#) >

[Quote](#) [Chart](#) [Fund Analysis](#) [Performance](#) [Sustainability](#) [Risk](#) [Price](#) [Portfolio](#) [People](#) [Parent](#)

Portfolio Equity Bond

Asset Allocation

Asset Class	Net	Short	Long	Cat.	Index
U.S. Equity	30.98	0.00	30.98	27.72	33.58
Non-U.S. Equity	11.91	0.00	11.91	13.07	14.59
Fixed Income	54.41	3.31	57.73	45.49	49.15
Other	-0.00	0.05	0.05	13.78	2.68
Cash	2.66	4.69	7.36	4.38	0.00
Not Classified	0.03	0.00	0.03	0.12	0.00

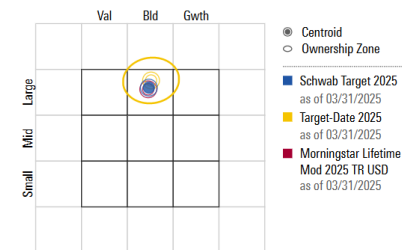
Investment as of Mar 31, 2025 | Category: Target-Date 2025 as of Mar 31, 2025 | Index: Morningstar Lifetime Mod 2025 TR USD as of Mar 31, 2025 | Source: Holdings-based calculations.

Market Cap

Avg Market Cap	Category Avg Market Cap	Index Avg Market Cap	
101.72 Bil	120.76 Bil	86.84 Bil	
Size	Investment %	Cat. Average %	Index %
Giant	16.41	17.46	17.92
Large	12.25	12.37	13.74
Mid	9.88	7.30	11.85
Small	2.69	2.13	3.74
Micro	1.13	0.55	0.80

USD | As of Mar 31, 2025 | Category: Target-Date 2025 | Index: Morningstar Lifetime Mod 2025 TR USD | Data is based on the long position of the equity holdings.

Stock Style Map Weight Historical



Measures

Value & Growth Measures	Investment	Cat. Average	Index
Price/Earnings	17.04	17.70	17.60
Price/Book	2.58	2.67	2.51
Price/Sales	1.90	2.06	1.89
Price/Cash Flow	10.61	11.47	11.03
Dividend Yield %	2.10	2.12	2.21
Long-Term Earnings %	10.13	10.08	10.06
Historical Earnings %	6.08	4.40	5.89
Sales Growth %	6.29	6.28	-0.03
Cash-Flow Growth %	22.48	18.61	4.18
Book-Value Growth %	1.81	3.12	5.70

Schwab Target 2025 SWHRX ★★★★★ Morningstar Medalist Rating

Portfolio | Medalist Rating as of Jan 31, 2025 | [See Charles Schwab Investment Hub](#) >

[Quote](#) [Chart](#) [Fund Analysis](#) [Performance](#) [Sustainability](#) [Risk](#) [Price](#) [Portfolio](#) [People](#) [Parent](#)

Portfolio Equity Bond

Asset Allocation

Asset Class	Net	Short	Long	Cat.	Index
U.S. Equity	30.98	0.00	30.98	27.72	33.58
Non-U.S. Equity	11.91	0.00	11.91	13.07	14.59
Fixed Income	54.41	3.31	57.73	45.49	49.15
Other	-0.00	0.05	0.05	13.78	2.68
Cash	2.66	4.69	7.36	4.38	0.00
Not Classified	0.03	0.00	0.03	0.12	0.00

Investment as of Mar 31, 2025 | Category: Target-Date 2025 as of Mar 31, 2025 | Index: Morningstar Lifetime Mod 2025 TR USD as of Mar 31, 2025 | Source: Holdings-based calculations.

Fixed Income Style

Fixed Income Measures	Investment	Category Average
Effective Duration	5.69	4.85
Modified Duration	5.61	—
Effective Maturity	7.32	6.49
Avg Credit Rating (surveyed)	AA-	AA-
Weighted Coupon	3.43	3.42
Weighted Price	94.86	94.88
Yield to Maturity	3.70	4.89

As of Mar 31, 2025 | Category: Target-Date 2025 | Source: Manager-reported and holdings-based calculations.

Exposure vs. Category %

Sectors	Investment %	Cat %
Government	47.47	50.23
Municipal	0.27	0.19
Corporate	20.61	22.14
Securitized	19.64	18.76
Cash & Equivalents	9.41	6.53
Derivative	2.60	2.14

As of Mar 31, 2025 | Category: Target-Date 2025 | Sector data is based on the rescaled long position of the holdings. | Source: Holdings-based calculations.

Bond Breakdown Credit Quality vs. Category %

Grades	Investment %	Cat %
AAA	19.59	37.32
AA	52.04	38.95
A	11.03	6.08
BBB	15.92	8.38
BB	0.64	4.82
B	0.15	2.30
Below B	0.15	0.90
Not Rated	0.48	1.26

As of Mar 31, 2025 | Category: Target-Date 2025 | Credit Quality Data is based on the long position of the holdings. | Source: Manager-reported

Holdings	Portfolio Weight	Market Value	Cur	Prospectus Net Expense Ratio	1-Year Return
Schwab US Aggregate Bond Index	23.27	96,573,966	USD	0.04	4.94
Schwab® S&P 500 Index	14.12	58,597,084	USD	0.02	8.21
Baird Aggregate Bond Inst	11.83	49,107,689	USD	0.30	5.22
Schwab Short-Term Bond Index	7.00	29,075,359	USD	0.06	5.76
Schwab Treasury Infl Protected Secs Idx	6.09	25,278,571	USD	0.05	6.26
Schwab International Opportunities	5.87	24,379,549	USD	0.85	1.99
Schwab® International Core Equity	4.45	18,480,530	USD	0.86	9.29
Schwab Select Large Cap Growth	3.96	16,436,497	USD	0.74	4.75
Dodge & Cox Stock I	3.16	13,131,679	USD	0.51	9.27
Schwab Global Real Estate	2.76	11,437,335	USD	0.71	3.66

AN EXAMPLE

A 2065 FUND

Fidelity Freedom 2065 FFSFX ★★★★★ Morningstar Medalist Rating

Medalist Rating as of Jan 5, 2025 | [See Fidelity Investment Hub](#) >

[Quote](#) [Chart](#) [Fund Analysis](#) [Performance](#) [Sustainability](#) [Risk](#) [Price](#) [Portfolio](#) [People](#) [Parent](#)

NAV / 1-Day Return 13.25 / +0.53%	Total Assets 1.9 Bil	Adj. Expense Ratio ⓘ 0.750%	Expense Ratio 0.750%	Distribution Fee Level High	Share Class Type No Load
Category Target-Date 2065+	Investment Style Large Blend	Credit Quality / Interest Rate Sensitivity High/Extensive	Status Open	TTM Yield 1.03%	Turnover 12%

<https://www.morningstar.com/funds/xnas/ffsfx/quote>

Fidelity Freedom 2065 FFSFX ★★★★★ Morningstar Medalist Rating

Portfolio | Medalist Rating as of Jan 5, 2025 | [See Fidelity Investment Hub](#) >

[Quote](#) [Chart](#) [Fund Analysis](#) [Performance](#) [Sustainability](#) [Risk](#) [Price](#) [Portfolio](#) [People](#) [Parent](#)

Portfolio Equity Bond

Asset Allocation

Asset Class	Net	Short	Long	Cat.	Index
U.S. Equity	50.45	0.00	50.45	41.37	56.10
Non-U.S. Equity	42.28	0.00	42.28	31.11	36.78
Fixed Income	10.76	0.00	10.76	5.01	7.05
Other	0.88	0.01	0.89	21.79	0.08
Cash	-4.41	7.66	3.25	1.80	0.00
Not Classified	0.04	0.00	0.04	0.04	0.00

Investment as of Feb 28, 2025 | Category: Target-Date 2065+ as of Mar 31, 2025 | Index: Morningstar Lifetime Mod 2065 TR USD as of Mar 31, 2025 | Source: Holdings-based calculations.

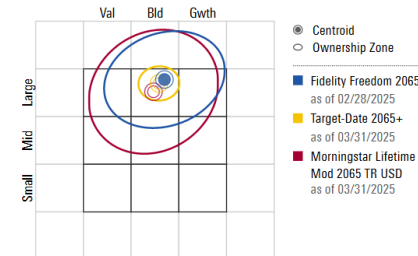
Market Cap

Avg Market Cap	Category Avg Market Cap	Index Avg Market Cap
100.66 Bil	85.87 Bil	67.28 Bil

Size	Investment %	Cat. Average %	Index %
Giant	42.71	30.74	34.79
Large	27.34	21.10	25.90
Mid	15.17	13.12	20.63
Small	5.97	4.72	9.11
Micro	1.26	1.53	2.13

USD | Investment as of Feb 28, 2025 | Category: Target-Date 2065+ as of Mar 31, 2025 | Index: Morningstar Lifetime Mod 2065 TR USD as of Mar 31, 2025 | Data is based on the long position of the equity holdings.

Stock Style Map Weight Historical



Measures

Value & Growth Measures	Investment	Cat. Average	Index
Price/Earnings	17.34	16.71	16.62
Price/Book	2.62	2.40	2.28
Price/Sales	1.92	1.82	1.72
Price/Cash Flow	11.07	10.55	10.23
Dividend Yield %	1.95	2.22	2.33
Long-Term Earnings %	11.05	10.26	10.11
Historical Earnings %	7.50	4.67	5.46
Sales Growth %	5.94	5.69	-0.97
Cash-Flow Growth %	5.44	15.22	3.68
Book-Value Growth %	7.67	3.93	5.45

Fidelity Freedom 2065 FFSFX ★★★★★ Morningstar Medalist Rating

Portfolio | Medalist Rating as of Jan 5, 2025 | [See Fidelity Investment Hub](#) >

[Quote](#) [Chart](#) [Fund Analysis](#) [Performance](#) [Sustainability](#) [Risk](#) [Price](#) [Portfolio](#) [People](#) [Parent](#)

Portfolio Equity Bond

Asset Allocation

Asset Class	Net	Short	Long	Cat.	Index
U.S. Equity	50.45	0.00	50.45	41.37	56.10
Non-U.S. Equity	42.28	0.00	42.28	31.11	36.78
Fixed Income	10.76	0.00	10.76	5.01	7.05
Other	0.88	0.01	0.89	21.79	0.08
Cash	-4.41	7.66	3.25	1.80	0.00
Not Classified	0.04	0.00	0.04	0.04	0.00

Investment as of Feb 28, 2025 | Category: Target-Date 2065+ as of Mar 31, 2025 | Index: Morningstar Lifetime Mod 2065 TR USD as of Mar 31, 2025 | Source: Holdings-based calculations.

Exposure vs. Category %

Sectors	Investment %	Cat %
Government	72.86	46.84
Municipal	0.00	0.36
Corporate	6.08	15.83
Securitized	0.18	11.40
Cash & Equivalents	20.54	19.38
Derivative	0.33	6.19

Investment as of Feb 28, 2025 | Category: Target-Date 2065+ as of Mar 31, 2025 | Sector data is based on the rescaled long position of the holdings. | Source: Holdings-based calculations.

Fixed Income Style Current Historical

Fixed Income Measures	Investment	Category Average
Effective Duration	13.47	9.04
Modified Duration	—	—
Effective Maturity	19.49	16.05
Avg Credit Rating (surveyed)	AA	A+
Weighted Coupon	3.55	3.66
Weighted Price	—	—
Yield to Maturity	0.00	5.14

Investment as of Feb 28, 2025 | Category: Target-Date 2065+ as of Mar 31, 2025 | Source: Manager-reported and holdings-based calculations.

Bond Breakdown Credit Quality vs. Category %

Grades	Investment %	Cat %
AAA	84.23	30.46
AA	4.42	17.61
A	1.55	24.28
BBB	3.63	25.39
BB	6.22	1.41
B	6.31	0.22
Below B	0.00	0.08
Not Rated	-6.36	0.55

Holdings	% Portfolio Weight	Market Value	Cur	Prospectus Net Expense Ratio	1-Year Return
Fidelity Series Emerging Markets Opps	9.79	184,895,912 USD		0.01	9.16
Fidelity Series Large Cap Stock	9.67	182,705,102 USD		0.00	11.14
Fidelity Series Growth Company	9.61	181,417,185 USD		0.00	4.43
Fidelity Series International Value	7.94	150,014,209 USD		0.01	12.84
Fidelity Series Overseas	7.69	145,158,315 USD		0.01	4.07
Fidelity Series International Growth	7.59	143,301,325 USD		0.01	-0.35
Fidelity Series Stk Selec Lg Cp Val	6.57	124,061,816 USD		0.00	9.39
Fidelity Series Value Discovery	6.09	114,948,765 USD		0.00	4.20
Fidelity Series Opportunistic Insights	5.91	111,631,424 USD		0.00	9.97
Fidelity Series Blue Chip Growth	5.25	99,133,713 USD		0.01	4.78

Holdings	% Portfolio Weight	Market Value as of Feb 28, 2025	Cur
US Treasury Bond Future June 25	2.57	48,536,531 USD	
10 Year Treasury Note Future June 25	1.63	30,772,969 USD	

SOME FINAL THOUGHTS & LIFE ADVICE

- Establish and grow your emergency / rainy day fund as soon as possible
- Avoid buying anything on credit (except a house)
- Pay your credit card in full every month. If you cannot pay it at the end of the month, you cannot afford it (emergencies notwithstanding)
 - Credit card debt is the worst! If you have it, pay that down first!
- Delay expensive purchases as long as possible
 - No, you do not need a new car. If you need a car, buy a good 5–10-year-old used car until you can buy new in cash.
- Have a good health insurance plan
- Be meticulous in planning and saving for major life events. Save religiously!
- Do not invest in any financial instrument you do not understand. Avoid exotic investments and stick to mutual / exchange-traded funds
 - And only to passively managed index funds!
- Renting can be financially more advantageous than owning a house, depending on the circumstances. Do not blindly jump into the “American dream.” Owning a house is expensive!
 - Owning a large house is even more expensive. Pools are overrated (and expensive)!

Live ~~below~~ within
your means

- The final grading will be as follows:
- Project Approval and Evaluation Form: 15 %
- Project 70%
 - Grade given by client: 40%
 - Engineering Design & Impact Statement: 30%
 - **Part I: 10 %**
 - **Part II: 10 %**
 - **Part III: 10%**
 - Final Exam covering the most critical aspects of lecture content: 15%