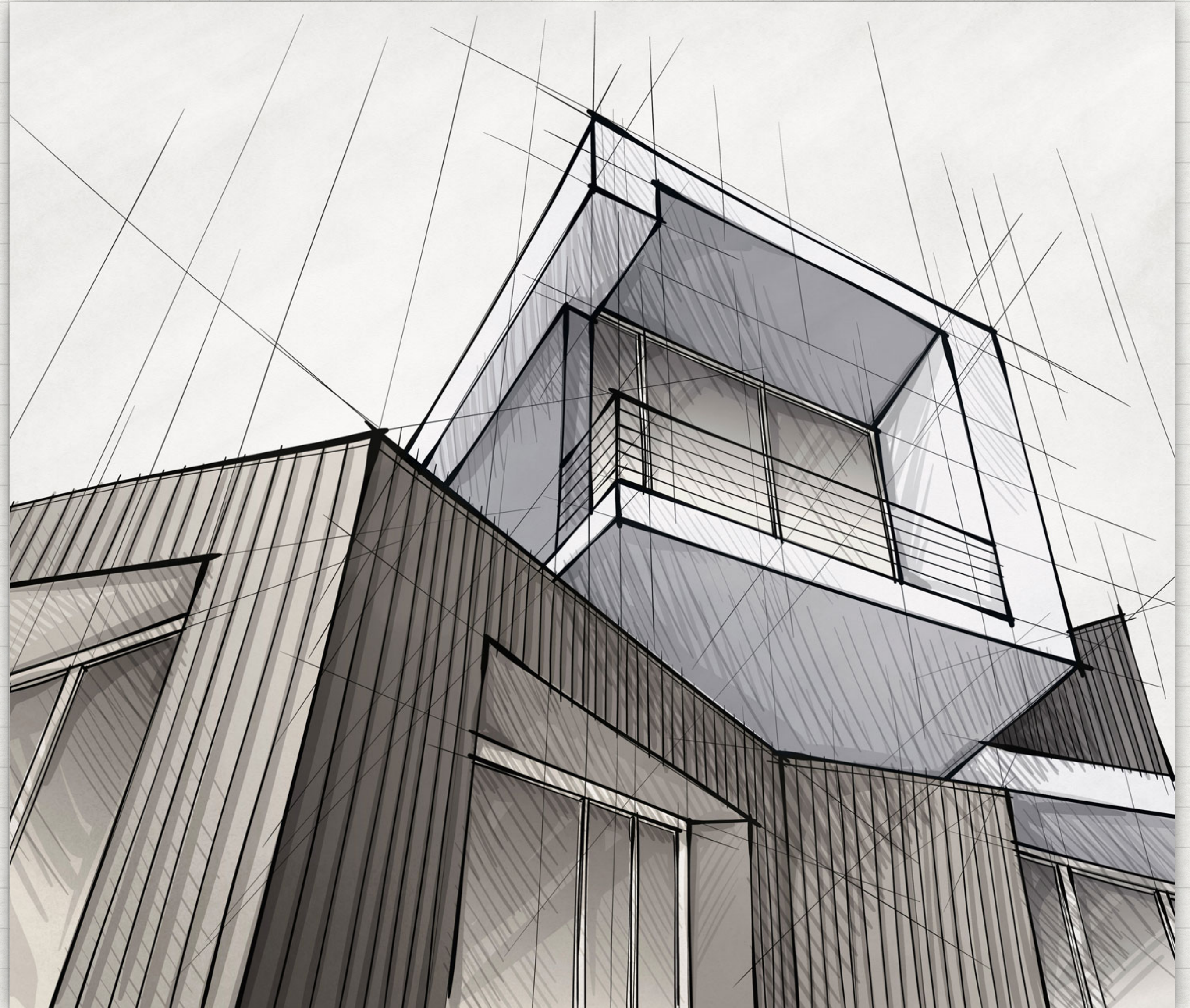# CS 007: SESSION 4

PERSONAL FINANCE FOR ENGINEERS

CS 007

SAVING & BUDGETS

INCOME & EXPENSES

Spend less than you make

DON'T BUY STUFF YOU CANNOT AFFORD

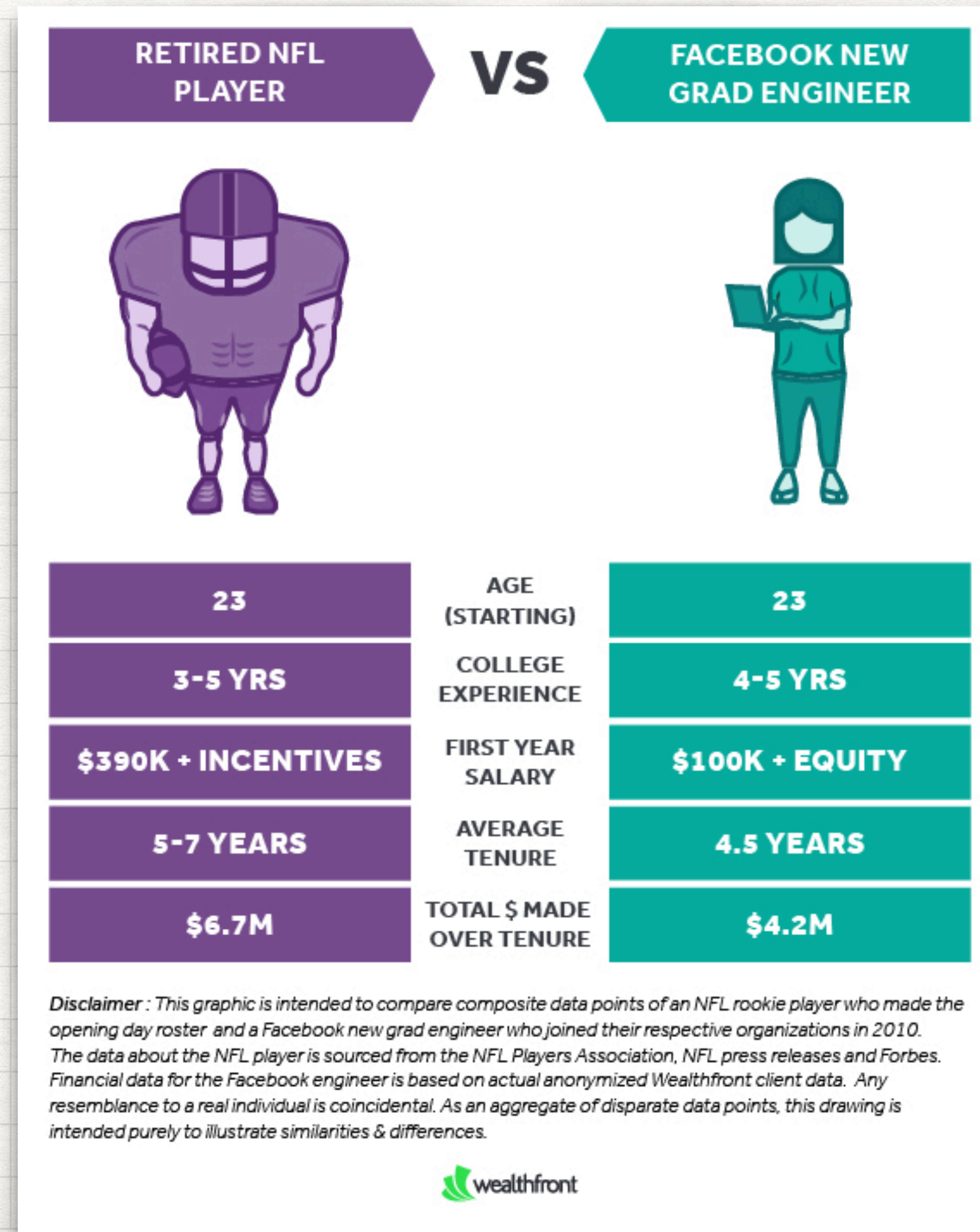https://www.nbc.com/saturday-night-live/video/dont-buy-stuff/n12020

SPEND LESS THAN YOU MAKE

- This is the **ultimate secret** to personal financial success.

- Important at almost every level of income & wealth.

- Important for all levels of success & intelligence.

- There is no amount of money that you can't spend. There are reasons why multi-millionaires go broke.

- Very easy to measure, few people do.
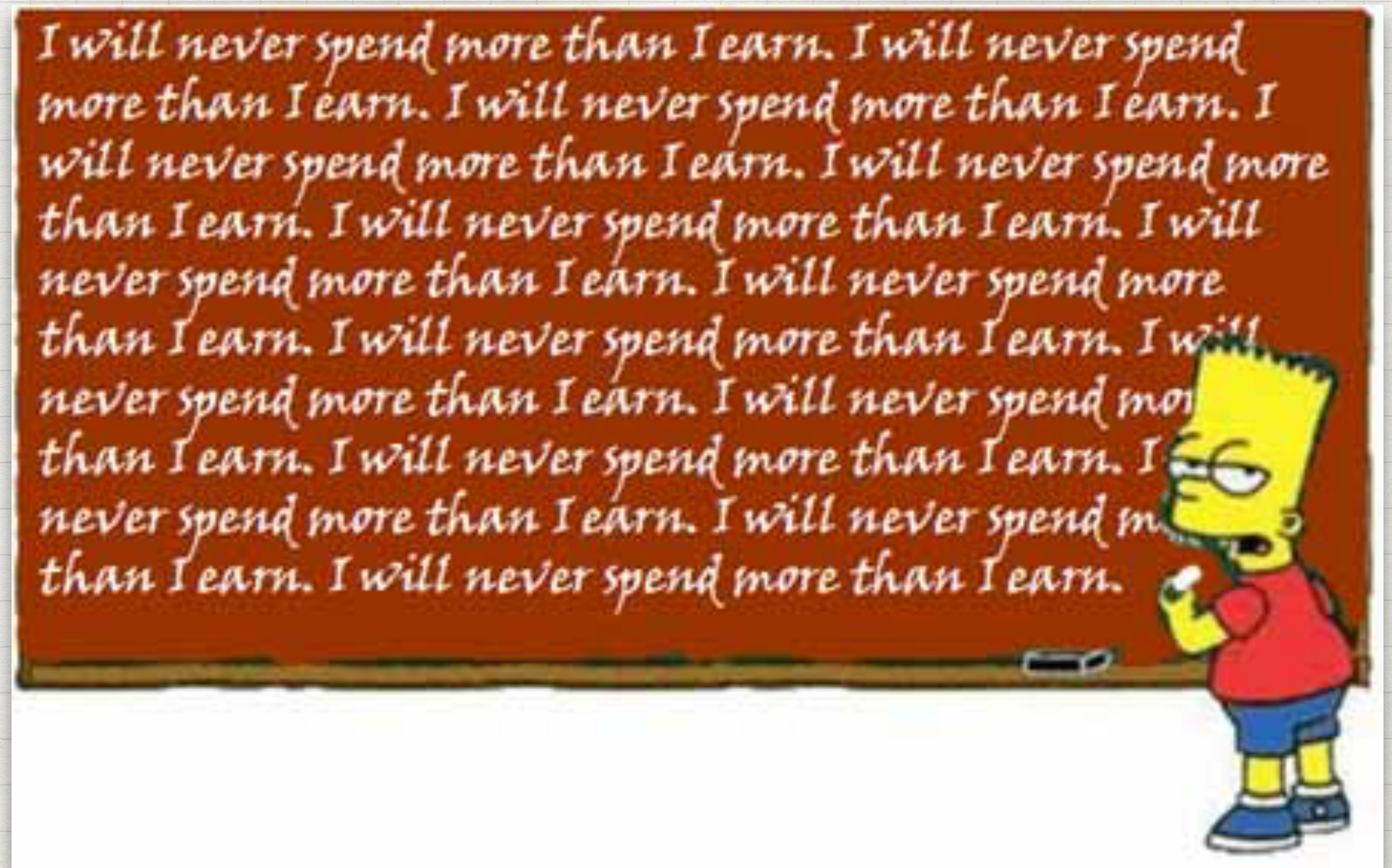
WHY IS THIS DIFFICULT?

- Not all expenses happen in the same time frame as income. Paycheck every two weeks vs. monthly or annual bills.

- Not all expenses are predictable

- Endowment effect can be counter-productive. A budget of $300 for clothing per month turns into a license to spend more than you need.

- Credit cards make it trivial to overspend

- Incomes fluctuate but lifestyle & expenses are sticky. Very difficult when you make a lot of money in a short amount of time (Hollywood, Pro Sports, Silicon Valley)

- Taxes are complicated.

RETIRED NFL PLAYER	VS	FACEBOOK NEW GRAD ENGINEER
23	AGE (STARTING)	23
3-5 YRS	COLLEGE EXPERIENCE	4-5 YRS
$390K + INCENTIVES	FIRST YEAR SALARY	$100K + EQUITY
5-7 YEARS	AVERAGE TENURE	4.5 YEARS
$6.7M	TOTAL $ MADE OVER TENURE	$4.2M

Disclaimer : This graphic is intended to compare composite data points of an NFL rookie player who made the opening day roster and a Facebook new grad engineer who joined their respective organizations in 2010. The data about the NFL player is sourced from the NFL Players Association, NFL press releases and Forbes. Financial data for the Facebook engineer is based on actual anonymized Wealthfront client data. Any resemblance to a real individual is coincidental. As an aggregate of disparate data points, this drawing is intended purely to illustrate similarities & differences.

wealthfront

STOP KEEPING UP WITH THE JONESES

- Why do we do it?
  - Desire to show off our success
  - Need to have what other people have. Even worse when it's an aggregation across a wide variety of lifestyles.

- They are broke.

- You have to set your own priorities.

SAVINGS RATES

How Much Should You Save?

US SAVINGS RATE

- Actually a number that governments track as an important macroeconomic statistic.

- US Personal Savings Rate was 3.6% in August 2017, but 6.6% in August 2018.

- Savings = Income - Spending

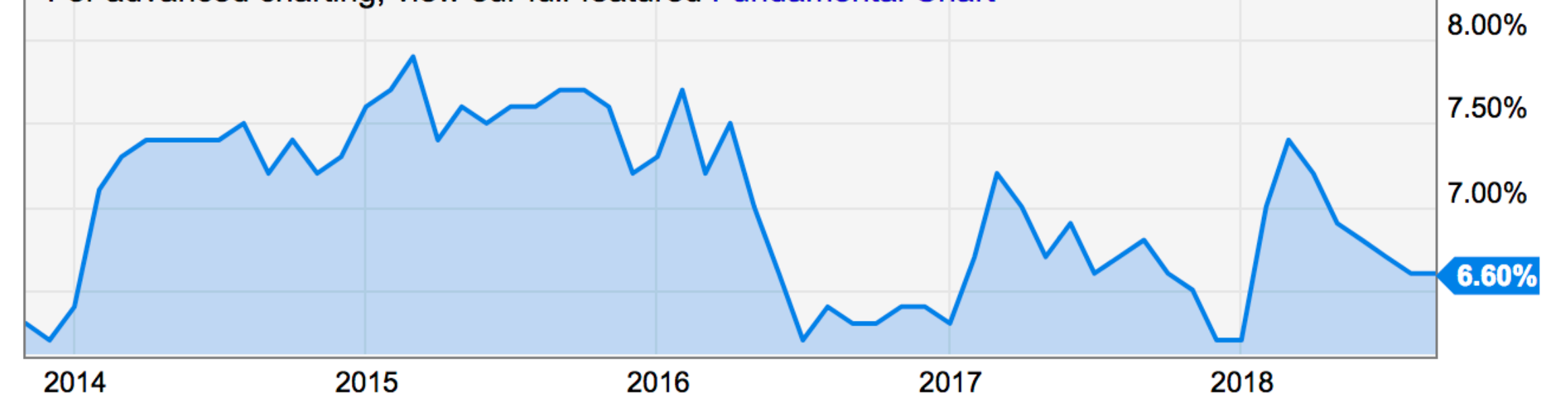- Does not account for non-income value generation or for future liabilities

* https://ycharts.com/indicators/personal_saving_rate

US PERSONAL SAVINGS RATE

SOURCE: TRADINGECONOMICS.COM | U.S. BUREAU OF ECONOMIC ANALYSIS

US Personal Saving Rate Chart

View Full Chart

For advanced charting, view our full-featured Fundamental Chart

6.60%

WHAT'S THE IDEAL TARGET?

- Most common recommendations: 10% & 15%

- No mathematical basis for 10%. Humans just like the number 10.

- 15% is based on historical assumptions of length of time working, rate of return, wage inflation, and 80% retirement income goal.

- Real answer: every % matters.

  - You lower the amount you need to live on / lifestyle.
  - You increase the pool of capital to hit that goal.

When you graduate, what percentage of your salary do you believe you should save every month?

79 out of 79 people answered this question

1	20%+	48 / **61%**
2	15%	20 / **25%**
3	10%	11 / **14%**
4	0%	0 / **0%**
5	6%	0 / **0%**

EMPLOYER BENEFITS TO SAVING

- Compensation structure can affect savings rates.

- If you receive a 10% bonus and don't spend it, that boosts your savings rate.

- Unfortunately, most people spend **more than their expected bonus** before they receive it.

- Three systemic ways to boost savings rates:

  - Forced savings (e.g. Australia) makes it a requirement to save a % of your pay.

  - Employer match (e.g. 401k) can contribute significantly to overall savings rates. (It's free money. Take it.)

  - Health savings accounts (HSA) may contribute to savings as well, although empirical evidence is limited.

401k Employer Matching Contribution Facts

$1,336 The average amount of employer match employees missed out on in 2014.

$42,855 The average amount of employer match an employee will miss out on over the span of 20 years.

$1.4B The total amount of unclaimed employer matching contributions, according to a survey of over 1 million employees.
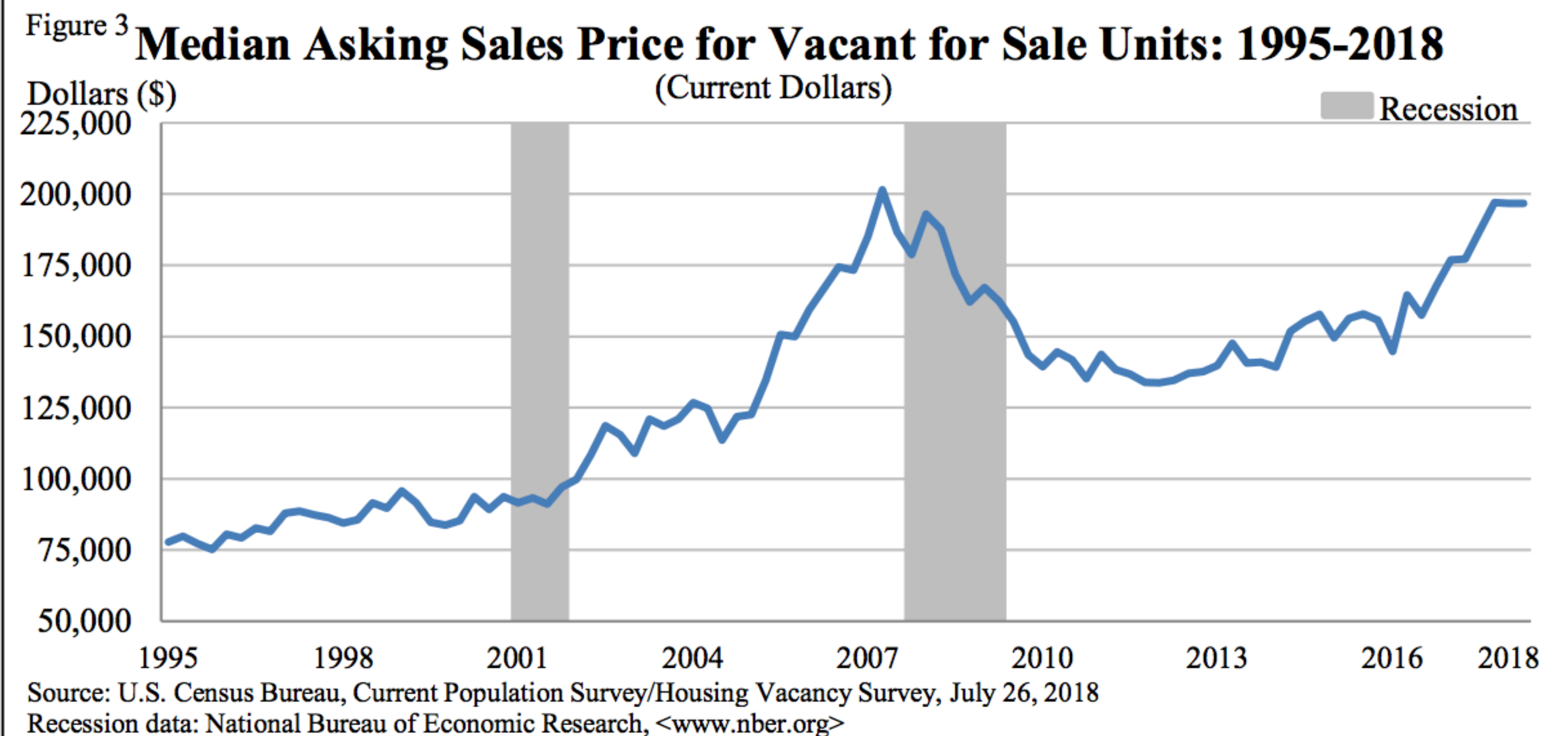
$24B The annual amount of lost employer matching contributions due to employees not saving enough.

MORTGAGE AS FORCED SAVING

- 64.3%% of Americans are homeowners (as of Q2 2018)

- Mortgage payments are made of two components: interest & principal.

- Paying off debt wipes a liability off your books, leaving the asset. This boosts your net worth, just like savings does.

- For many Americans, the forcing function of monthly principal payments effectively leads them to build significant value in their homes over long time periods (decades).

Figure 3
Median Asking Sales Price for Vacant for Sale Units: 1995-2018
(Current Dollars)

Source: U.S. Census Bureau, Current Population Survey/Housing Vacancy Survey, July 26, 2018
Recession data: National Bureau of Economic Research, <www.nber.org>

* https://www.census.gov/housing/hvs/files/currenthvspress.pdf

THE BENEFITS OF AUTOMATION

- Pay Yourself First

- Build a budget, calculate your savings, automate the withdrawal, just like taxes.

- Opt-out enrollment in 401(k) plans is far more effective than Opt-in.

- Automatic increases in 401(k) contributions is far more effective than Opt-in.

- When your salary increases, try to save that percentage. You can boost your savings rate over time.

- Money not seen is less likely to be spent.

* https://www.census.gov/housing/hvs/files/currenthvspress.pdf

BUDGETING

Where Does Your Money Go

WHAT IS A BUDGET

- Breakdown of spending, by category

- If you are settled, you can build a surprisingly accurate budget by looking at your spending for the last 3 months and averaging.

- Don't forget annual expenses

- Emergency fund is meant to handle truly unusual expenses, not overspending on holiday gifts.

GROCERIES

HOME

GIFTS

ENTERTAINMENT

TRAVEL

CLOTHING

LAUREN'S FUN MONEY

MARK'S FUN MONEY

BANK

the thinking closet

* https://ycharts.com/indicators/personal_saving_rate

TRACKING EMPIRICAL VS. IDEAL RESULTS

- Big difference between what you are spending in a category & what you need to spend in a category

- Comparables from colleagues / friends are valuable, but need to be taken in context

- Track your ideal vs. empirical results on a regular basis.

- The key metric for a budget is whether or not it is realistic
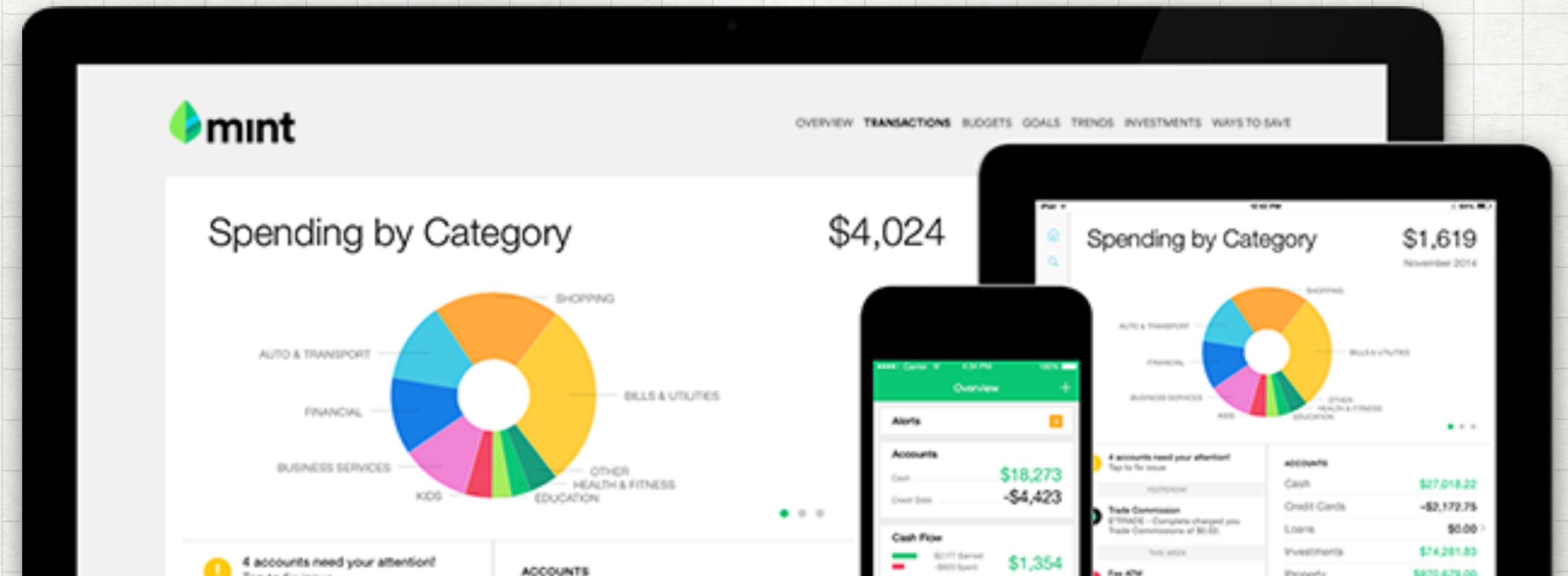
NEEDS / WANTS / SAVINGS & DEBT

- "All Your Worth" - Elizabeth Warren (D) co-authored with her daughter

- 50 / 30 / 20 in the book, but those are unlikely to be your #'s.

- **Needs**: Keep roof over your head, safe, healthy and able to work.

- **Wants**: Any other consumption

- **Savings / Debt**: Paying down debt, building emergency fund, saving for long term goals

YOU CAN MAKE IT WORK

- There are people who make less than you who manage to save 💰

- There are people who make more than you who go bankrupt.

- Beware of emotional justification: language like "I've earned this" or "I deserve this" or "why not me?"

- It has been demonstrated that just the act of making a budget reduces the amount that people spend.

- Do not be surprised if you go over your budget. Leave a buffer estimating income & allocating spending.
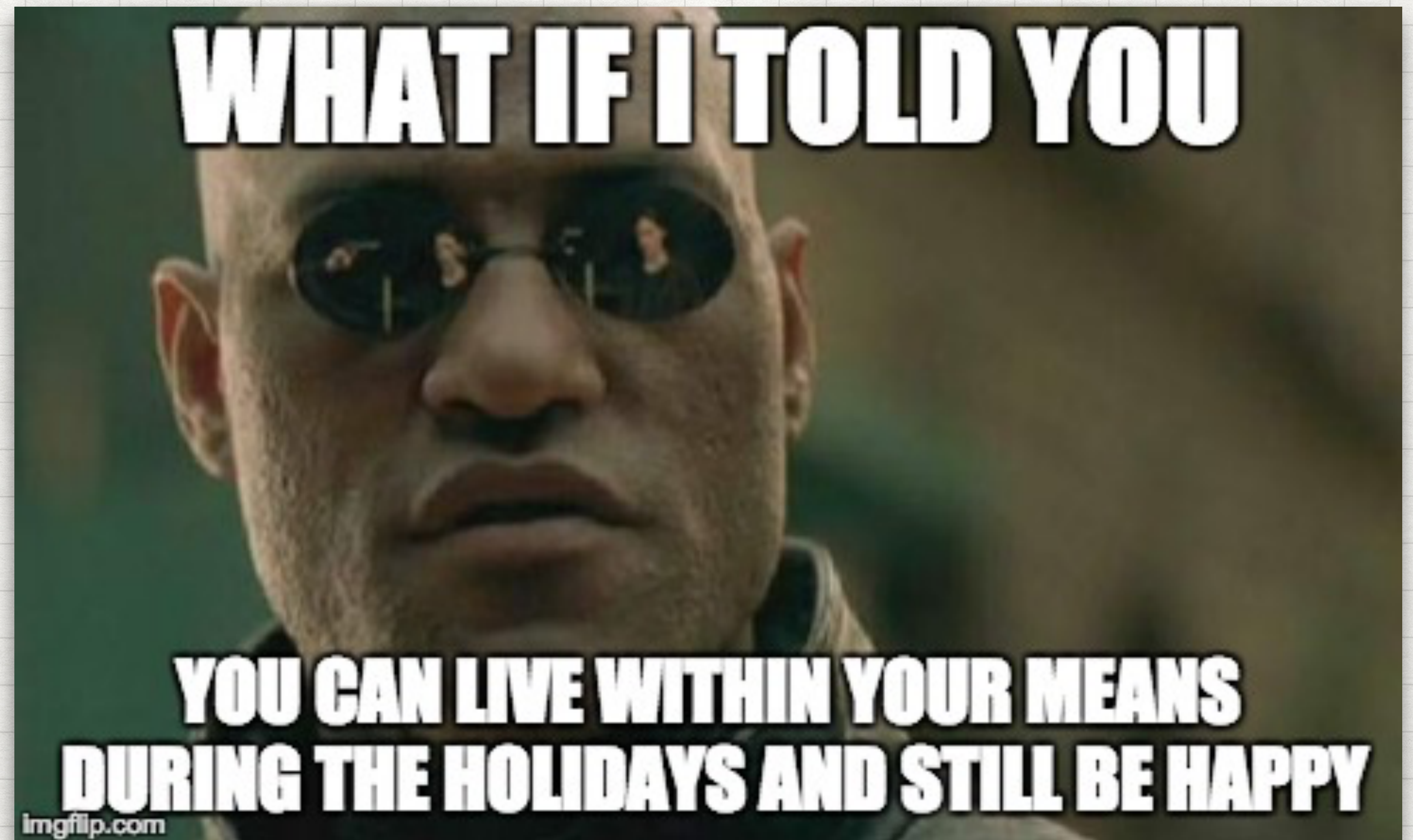
INCOME STATEMENT

Pulling It All Together

WHAT IS AN INCOME STATEMENT

- An **income statement** is a financial statement that reports a company's financial performance over a specific accounting period.

- A **personal income statement** reviews a time period including income, expenses, and savings.

Paul's Guitar Shop, Inc. Income Statement For the Year Ended December 31, 2015		
Revenues		
Merchandise Sales	$ 24,800	
Music Lesson Income	3,000	
Total Revenues:		$ 27,800
Expenses		
Cost of Goods Sold	10,200	
Depreciation expense	2,000	
Wage expense	750	
Rent expense	500	
Interest expense	500	
Supplies expense	500	
Utilities expense	400	
Total Expenses:		14,850
Net Income		$ 12,950

EXAMPLE: INCOME STATEMENT

- **Best source for income data:**
  Pay Stub

- **Best source for expenses?**
  Last 3 months of spending

- **Best source for comparables?**
  Colleagues / Friends / Family

Income			
	Salary		
	UnicornTech	$ 12,000.00	100.0%
	- Taxes	($ 2,430.40)	20.3%
	- Insurance	($ 739.98)	6.2%
	Total Salary	**$ 8,829.62**	**73.6%**
Total Income		**$ 8,829.62**	**73.6%**
Savings			
	Retirement		
	Roth 401K	$ 500.00	4.2%
	IRA	$ 0.00	0.0%
	Total Retirement	**$ 500.00**	**4.2%**
	College		
	Pride & Joy 529	$ 250.00	2.1%
	Total College	**$ 250.00**	**2.1%**
Total Savings		**$ 750.00**	**6.3%**
Debt Repayment			
	Housing		
	Mortgage	$ 2,500.00	20.8%
	Total Housing	**$ 2,500.00**	**20.8%**
	College		
	Stanford Loans Consolidated	$ 250.00	2.1%
	Total College	**$ 250.00**	**2.1%**
Total Debt Repayment		**$ 2,750.00**	**22.9%**

Annual Expenses		
	Life Insurance	$ 800.00
	Property Tax	$ 7,800.00
Total Annual Expenses		**$ 8,600.00**

Expenses			
	Housing		
	Utilities	$ 300.00	2.5%
	Water/Garbage	$ 120.00	1.0%
	AT&T Wireless	$ 120.00	1.0%
	TV / Netflix / Hulu	$ 110.00	0.9%
	Home Insurance	$ 76.50	0.6%
	Maintanence	$ 200.00	1.7%
	Total Housing	**$ 926.50**	**7.7%**
	Auto		
	Toyota Prius	$ 323.50	2.7%
	Auto Insurance	$ 132.29	1.1%
	Gas	$ 100.00	0.8%
	Repairs/License	$ 0.00	0.0%
	End Auto	**$ 555.79**	**4.6%**
	Household Expenses		
	Groceries/Costco	$ 800.00	6.7%
	Dining Out	$ 400.00	3.3%
	Entertainment	$ 50.00	0.4%
	Clothing	$ 150.00	1.3%
	Periodicals	$ 38.00	0.3%
	Personal Spending	$ 100.00	0.8%
	Pets	$ 50.00	0.4%
	Computers/Gadgets	$ 200.00	1.7%
	Gym	$ 70.00	0.6%
	Gifts	$ 100.00	0.8%
	Charity	$ 300.00	2.5%
	Medical	$ 100.00	0.8%
	Total Household Expenses	**$ 2,358.00**	**19.7%**
	Annualized Expenses	**$ 716.67**	**6.0%**
End Expenses		**$ 4,556.96**	**38.0%**
Cash Flow Buffer		**$ 772.66**	**6.4%**

ONGOING MAINTENANCE

- **Quarterly**

  - Check your progress, real vs. expected

- **Annual**

  - Model in changes & learnings from real behavior.

- **Automate**

  - The more you automate your savings & spending, the less room for error.

CS 007

QUESTIONS

- Liquidity

- Emergency Funds

- Assets & Liabilities

- Net Worth

- Personal Balance Sheet