

Saving for Retirement: The Life Cycle Model

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Introduction

- Three years ago, my son was finishing college and starting his first job.
- He asked:
 - How much should I spend / save?
 - How much will I owe in taxes?
 - Should I start saving for retirement now?
 - And so on.

Introduction, cont.

- I answered him with these slides.
- He claims he found them useful;
 - Even passed along to friends.
- That is what I will present tonight.

What is the Question?

- Assume you are:
 - Finishing school and starting your first job.
- You want to plan your financial future.
 - Not just next few years;
 - Entire working life plus retirement.
- How much consume, spend, bequeath?

Planning Your Financial Life

- Might seem complicated.
 - We will try to make it simple;
 - By assuming away some details.
- Will argue that, to a first approximation
 - Many details do not matter too much.
- And Professor Dynan will address gaps.

Outline

- Basic Life Cycle Model
- Adjusting for Taxes and Benefits
- Adjusting for Interest Rates?
- Tax Deferred Savings

Assumptions

- For initial analysis, ignore:
 - Taxes, Uncertainty, Health Care, Social Security, Medicare, Inflation, Portfolio Choices, Housing, Insurance, 401(k)s, ...
- Assume interest rate, r , is 0.
 - And ignore real vs nominal for now.

Framework

- Work for W years;
- Retire for R years.
- Earn income Y per year in working life.
- Consume C_W while working;
 - C_R when retired.

Calculating Consumption

- Total resources over your life:

$$Y * W$$

- Total consumption over your life:

$$(C_W * W) + (C_R * R)$$

Calculating Consumption, cont.

- So Y , W , R , C_W , C_R must satisfy:

$$(C_W * W) + (C_R * R) = Y * W$$

–NB: assumes no bequests.

Implications

$$(C_W * W) + (C_R * R) = Y * W$$

- Earning more raises C_W , C_R . (c.p.)
- Working longer raises C_W , C_R . (c.p.)
- Lowering C_W raises C_R . (c.p.)

For a Well-Funded Retirement:

- Earn a higher income;
- Work longer, retire less;
- Spend less while working, i.e., save more.

TANSTAAFL

- There Ain't No Such Thing As A Free Lunch
- Usually attributed to Milton Friedman
- A few exceptions (discussed later);
 - But not many.

Two Examples

- Start work at 25; retire at 75; live till 95.
- Earn either \$50,000 or \$100,000 per year.
- Assume you want $C_R = .9 * C_W$

Examples, cont.

- For the \$100K individual, get
 - $C_W = \$73,529$ per year.
- For the \$50K individual, get
 - $C_W = \$36,765$ per year.

Cost of Living

- Food \$5,000-10,000
- Housing \$12,000-24,000
- Transportation \$3,000-5,000
- Health Insurance \$4,000
- Clothes \$2,000
- Travel, Entertainment \$5,000

- Total \$31,000-50,000

Adding in Key Issues

- Taxes
- Social Security
- NB: still ignoring several others:
 - e.g., uncertainty about length of life.

Taxes

- Define Y_D , disposable income, as:
 - $Y_D = Y - T$, where T is taxes
- Then modify above to:

$$(C_W * W) + (C_R * R) = Y_D * W$$

Taxes for High Earner

- Federal income tax: \$15,416
- State (MA) Income tax: \$4,876
- SS, DI, Medicare (FICA) tax: \$7,650
- 28% average tax rate.

Taxes for Medium Earner

- Federal income tax: \$4,373
- State (MA) Income tax: \$2,326
- SS, DI, Medicare (FICA) tax: \$3,825
- 21% average tax rate

Social Security

- Government “retirement” system.
- Levies taxes on working population:
 - Regressive
- Pay benefits to “retired” population
 - Progressive

Social Security, cont.

- Eligibility:
 - Pay SS taxes for at least 40 quarters
 - Reach “retirement” age.
- Once reach eligibility,
 - \$B per year for rest of life.
- B depends on your earnings history.

Adjusting for Social Security

- So the constraint on lifetime resources is:

$$(C_W * W) + (C_R * R) = (Y_D * W) + (B * R)$$

Examples, Updated

- For \$100K earner:
 - Assume $Y_D = .72 Y$ and $B = .225 * Y$
 - Implies can consume \$59,559 per year.
- For \$50K earner:
 - Assume $Y_D = .79 * Y$ and $B = .30 * Y$
 - Implies can consume \$33,456 per year.

Summary So Far

- Provided a framework for planning your financial future.
- Provided illustrative calculations of amounts.
- Discovered that taxes matter!

Accounting for $r > 0$

- So far, assumed a zero return on savings.
- If $r > 0$, can afford more C .
- And impact substantial in principle:
 - Magic of compound interest.
- But $r=0$ still a useful base case.

Why $r=0$ is Reasonable

- Safe rates are tend to be low:
 - Especially recently, but also more generally.
- Higher returns are possible:
 - But require higher risk.
 - So $r > 0$ is not a free lunch.

Why $r=0$ is Reasonable, cont.

- Interaction between taxes and inflation:
 - Makes $r=0$ a reasonable approximation.
- Say $r = 2\%$, inflation = 2% , tax rate = 25%
- Then after-tax, inflation-adjusted return is:

$$(1-t) * 2\% - 2\% = (1-.25)*2\% - 2\% = -0.5\%$$

Implication

- If only mechanism for saving is taxable accounts:
 - After tax return likely small to zero.
 - So accounting for non-zero rates will not meaningfully change calculations above.
- BUT: Tax-Deferred Savings to the rescue!

Tax-Deferred Saving

- Under current policy:
 - Substantial tax advantages from savings.
- Focus on simplest version.
- Known as 401(k) plans.
 - Named after relevant section of tax code.

401(k) Plans

- Employer withholds some of your salary.
 - Puts this into an account that you own.
- Returns accumulate tax free;
- No (current) income tax on contributions;
- Many employers **match**, partially or fully.

401(k), cont.

- Withdrawals in retirement owe income tax.
- BUT, 401(k)s are still valuable:
 - Contributions grow at pre-tax rate.
 - Some employers match
 - Lower tax rates in retirement

Aside: IRAs, Roths, SEPs, etc

- Even if your employer does not offer a 401(k) or similar plan, you might have options to save tax-deferred.

- See

<https://www.investopedia.com/ask/answers/08/roth-traditional-sep.asp>

401(k): Example

- Contribute max, \$19,000, every year:
- So taxable income declines by \$19,000.
- But Y_D declines by only $(1-t)*\$19,000$.
 - Would have paid $t * \$19,000$ in taxes.
- How much wealth does this generate?

401(k) Example, cont.

- Put \$19,000 into 401(k) per yr for 50 yrs.
 - Assume real interest rate is 2%.
 - Higher because no taxes, inflation interaction.
- Then at retirement, will have \$1.6 million.
 - Compared to \$950,000 at $r = 0$.
- If retire for 20 years, about \$80,000 / year.

Should You Max Out 401(k)?

- For high earners, YES:
 - \$19,000 per year will be about optimal savings rate
- For moderate or low earners, less clear:
 - \$19,000 per year implies a high savings rate;
 - So low consumption during working life.

Max Out 401(k), cont.

- Still, even low and moderate earners should use 401(k)s to some degree:
 - It is a tax effective way of saving.
- In particular, contribute the amount that will be matched by employer:
 - Since that part earns a really good return.

Summing Up

- Think ahead:
 - **START PLANNING for RETIREMENT NOW.**
- To have a financially sound retirement:
 - Work harder
 - Work longer
 - Spend Less = Save More
 - Take advantage of tax deferred savings.