

Real and Nominal Savings

Kevin Crotty
BUSI 448: Investments

Where are we?

Last time:

- Saving for retirement

Today:

- Real and nominal cash flows and rates
- Uncertainty in returns

Saving for retirement with inflation

Saving for retirement with inflation

- Now assume we consume a constant **real** amount in retirement
 - our standard of living will be unchanged each year
- Can finance with constant nominal or real saving
- Assume a nominal rate of 5% and inflation of 2% each year

Q1: How much do we need to save each year if saving a constant real amount?

Q2: How much do we need to save each year if saving a constant nominal amount?

Real and Nominal Cash Flows

What is the relationship between real and nominal cash flows at a point in time t ?

$$\text{Nominal CF}_t = \text{Real CF}_t \cdot (1 + \text{inflation})^t.$$

What does the above look like?

Real and Nominal Discount Rates

What is the relationship between real and nominal rates?

$$1 + \text{nominal rate} = (1 + \text{real rate})(1 + \text{inflation}).$$

- Nominal cash flows are discounted/compounded using nominal rates.
- Real cash flows are discounted/compounded using real rates.

Uncertain returns

Simulating random returns

We can easily simulate random returns in Python

```
1 from scipy.stats import norm
2 norm.rvs(loc=0.03, scale=0.1, size=50)
```

- What does the distribution of ending balances look like if we save \$32,000 for 30 years (in real terms) and withdraw \$100,000 for 20 years? (both in real terms)
 - Assume real returns are normally distributed with mean of 3% and standard deviation of 10%.
- How often do we run out of money?!?

For next time: Returns, returns, and more returns...

