



INTRO TO FIXED INCOME

all about fixed income ...

Fixed Income?

- Consistent, definite cash flows at certain time periods
- E.g. Bonds, annuities, swaps, agencies, CDOs ...

WOAH WOAH WOAH
THE ** ARE THOSE**

Some statistics

- Total US fixed income market is at **\$39.7T as of 2017**
 - Treasuries (35.2%), Mortgage related (22.6%), Corporate debt (21.8%)
- Total US equity market is only **\$27.4T as of 2017**

Time value of money

- From the individual...
 - Ashane has the choice of \$1 now, or \$1 after he graduates and goes back to California
 - (also assume that Ashane has some basic financial knowledge)
- From the investor...
 - Ashane approaches Shivansh (a loanshark) for a 1-year loan of \$5 to buy boba today
 - What would make Shivansh lend to Ashane?
- **Segue**: inflation risk, credit risk, market risk, and many more...

Zero-coupon bonds

- **Single cash flow** occurring at the end of the bond's maturity
- E.g. Ashane promises to pay a fixed amount of \$100 to Shivansh in 5 year's time
 - How much money would Shivansh lend to Ashane in the present?
 - Shivansh earns interest on this loan; but where is the interest?
- In the US, you can buy Treasury ZCBs known as STRIPS (Separate Trading of Registered Interest and Principal of Securities)

Coupon bonds

- We now know how to price ZCBs, but how do we price coupon bonds?
- First off, what is a coupon bond???
- E.g. Ashane Inc. is raising money to fund Ashane's new dog. Ashane Inc. issues a 3-year coupon bond paying \$100 at the end of the 3rd year, and \$5 at the end of each of the three years
- Price by **Law of One Price!**

Annuities (& perpetuities)

- We've covered what a zero-coupon bond and a coupon paying bond is...
- So what is an annuity?
- An annuity is a **series of regular cash flows** for a finite period of time
- E.g. AshaneLife offers a 10-year annuity paying \$1 at the end of each calendar year
 - Is this series of cash flow free?
 - No! Unless AshaneLife wants to go bankrupt
 - But how much should AshaneLife require customers to pay in the present for these CFs?
- Answer: the geometric series!

But I'm not that good at math...

- **It's ok!** The world has created the BA-II Plus for a *damn good reason*
- Things to note:
 - Set the payment per period to 1/yr
 - CLEAR TVM every time you are done
 - Cash flows vs. PV must have negative signs
- With any 4 of **N, I/Y, PV, PMT, FV**, I can solve for the unknown 5th

Time for a problem!

- Q1. Ashane Inc. issued a 5-year bond with face value of \$100, and an annual coupon rate of 5%. If the current market required yield of Ashane Inc is 8%, what is the price of the bond investor Shivansh is willing to pay / how much money would Ashane Inc. raise from the debt issuance?
- Q2. AshaneLife is offering an annuity paying \$100 at the end of each year for 10 years. If Ariel pays \$xxx for the annuity, what is the interest rate that Ariel earns on the annuity?