ACCT 101: Liabilities and Time Value of Money

Session 7

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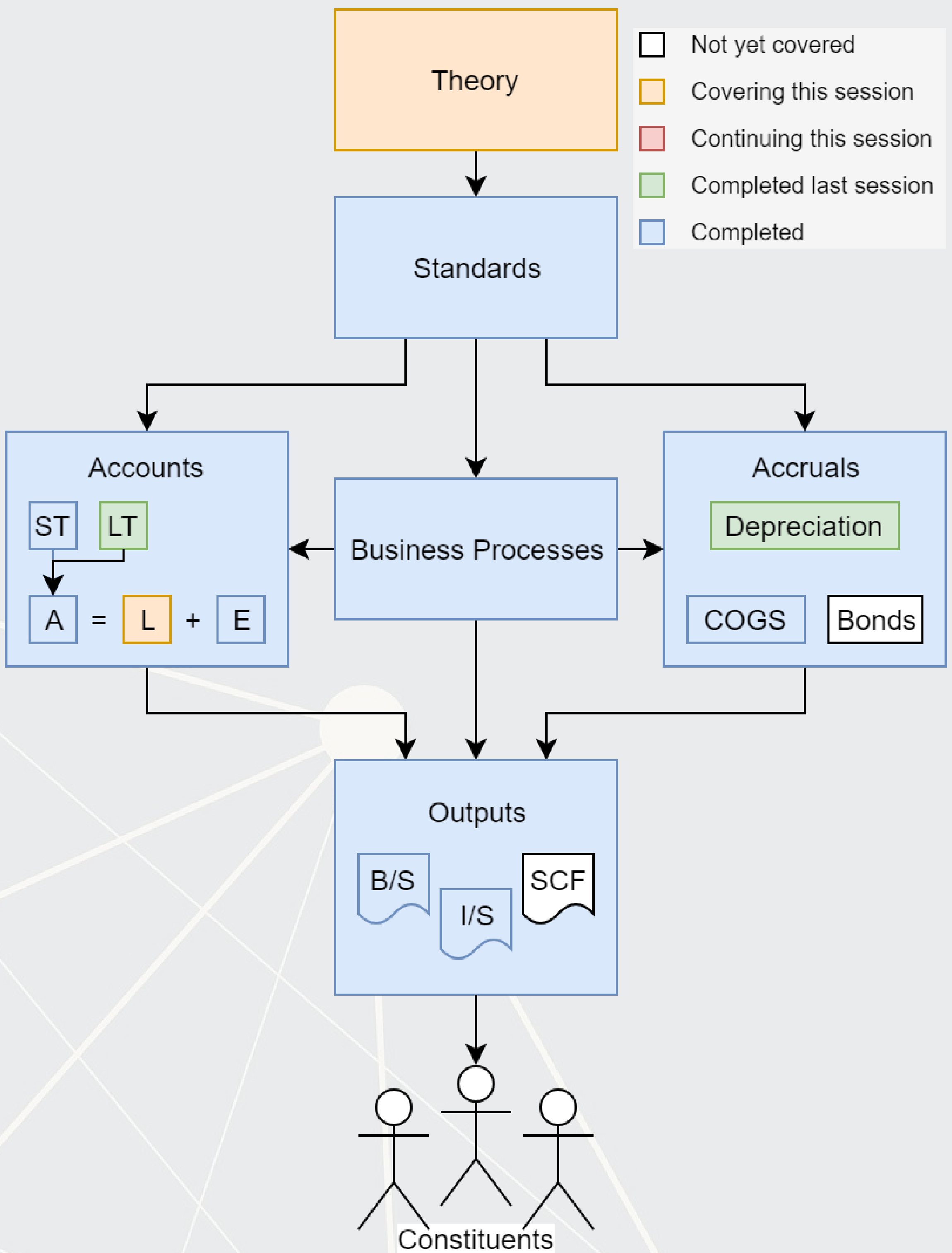
Frontmatter

Learning objectives



Current liabilities (Chapter 8)

1. Account for current liabilities
2. Account for contingent liabilities
3. Become familiar with "time value of money"
   - We'll need this for Bonds next session

Current Liabilities

Review of liabilities

> Obligation of the enterprise arising from past events, the settlement of which is expected to result in an outflow from the enterprise of resources embodying economic benefits. (FRS 37:10)

- Current liability: Something you owe within the span of one year (the current accounting term)
- Non-Current liability: Something you owe after the current accounting term

Current liabiilty examples

- Accounts payable
- Unearned revenue
- Salaries payable
- Taxes payable
- Notes payable
- Interest payable
- _________ payable
- Estimated liabilities
  - Provision for Warranty repairs
  - Liabilities Contingent

Sales tax payable

- Also known as GST
- Generally paid quarterly
  - Can pay monthly as well
- Retailers collect this from customers to pass to tax authorities (IRAS)

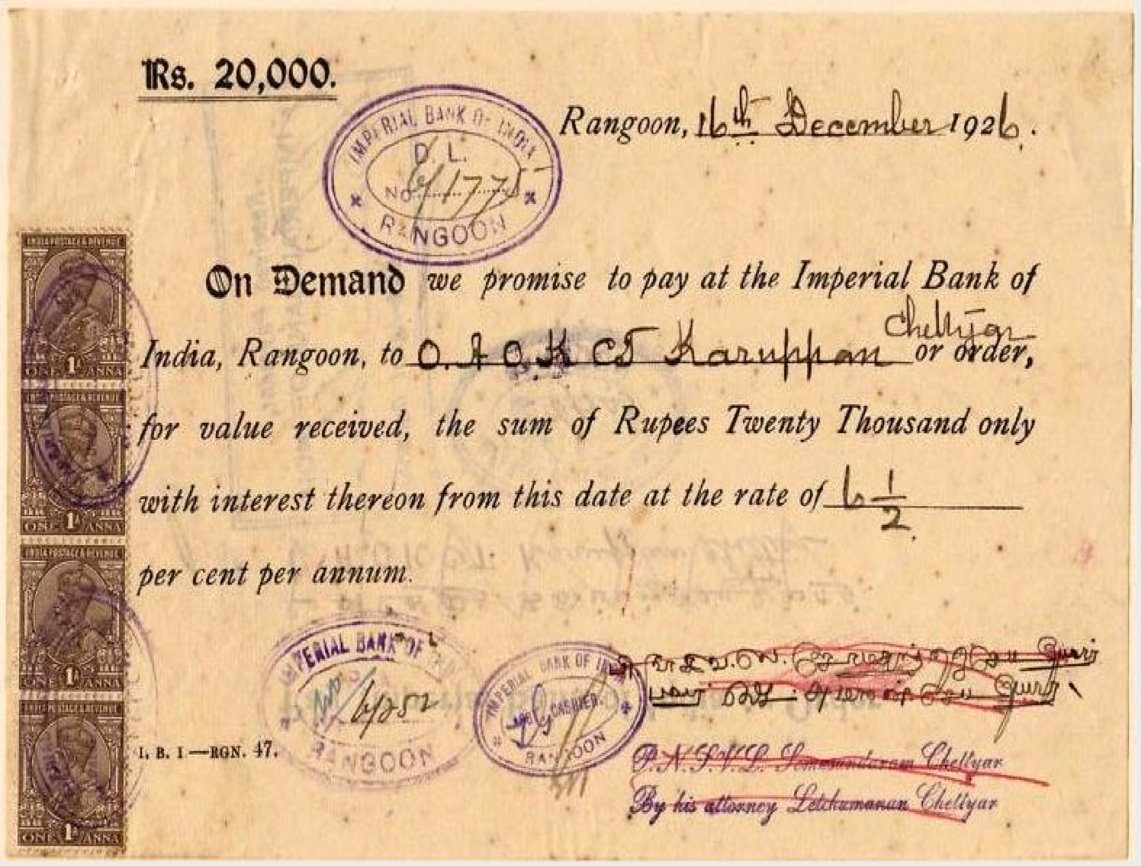
INLAND REVENUE AUTHORITY OF SINGAPORE

Example: Sales tax

Date	Account	DR	CR
20YY.MM.D1	Cash	20,000	
	Revenue		18,600
	Sales tax payable		1,400
Recorded sales and sales tax for the day			
20YY.MM.D2	Sales tax payable	1.400	
	Cash		1.400
Paid sales tax to IRAS			

Notes payable

- Notes payable is a small, short-term loan
- Similar to A/P, but:
  - More formal
  - Has a stated interest rate
- Can be provided by any party
  - Banks
  - Suppliers



Rs. 20,000.

Rangoon, 16th December 1926.

On Demand we promise to pay at the Imperial Bank of India, Rangoon, to O.A.O.K.C.T. Karuppan Chettyar or order, for value received, the sum of Rupees Twenty Thousand only with interest thereon from this date at the rate of 6 1/2 per cent per annum.

I. B. 1—RGN. 47.

P.N.S.V.L. Somasundaram Chettyar
By his attorney Letchumanan Chettyar

This is included in Chapter 5 in the book

Notes payable terms

- *Creditor*: the lender
- *Debtor*: the party that owes money
- *Term*: length of time of the note
- *Maturity date*: when the note is due
- *Principal*: amount of money borrowed
  - We'll record this at the start
- *Interest*: additional payments for borrowing
  - We'll record these as they occur
    - Or when doing adjusting entries
- *Maturity value*: amount owed at maturity
- Interest is usually all paid at the end
  - The interest rate will be given as the *annual* rate

Notes payable debtor

> Received a $2,000 note payable with 9% interest due in 3 months payable to our supplier.

Example: Note payable

Date	Account	DR	CR
20Y8.12.01	Cash	2,000	
	Notes payable		2,000
Received a $2,000 note payable from supplier			
20Y8.12.31	Interest expense	15	
	Interest payable		15
Recorded accrued interest owed on note payable; 2,000 x 9% x 1/12			
20Y9.02.28	Notes payable	2,000	
	Interest expense	30	
	Interest payable	15	
	Cash		2,045
Paid off note payable, including interest of 2,000 x 9% x 3/12 (1 month recorded prior)			

The other side: Notes receivable

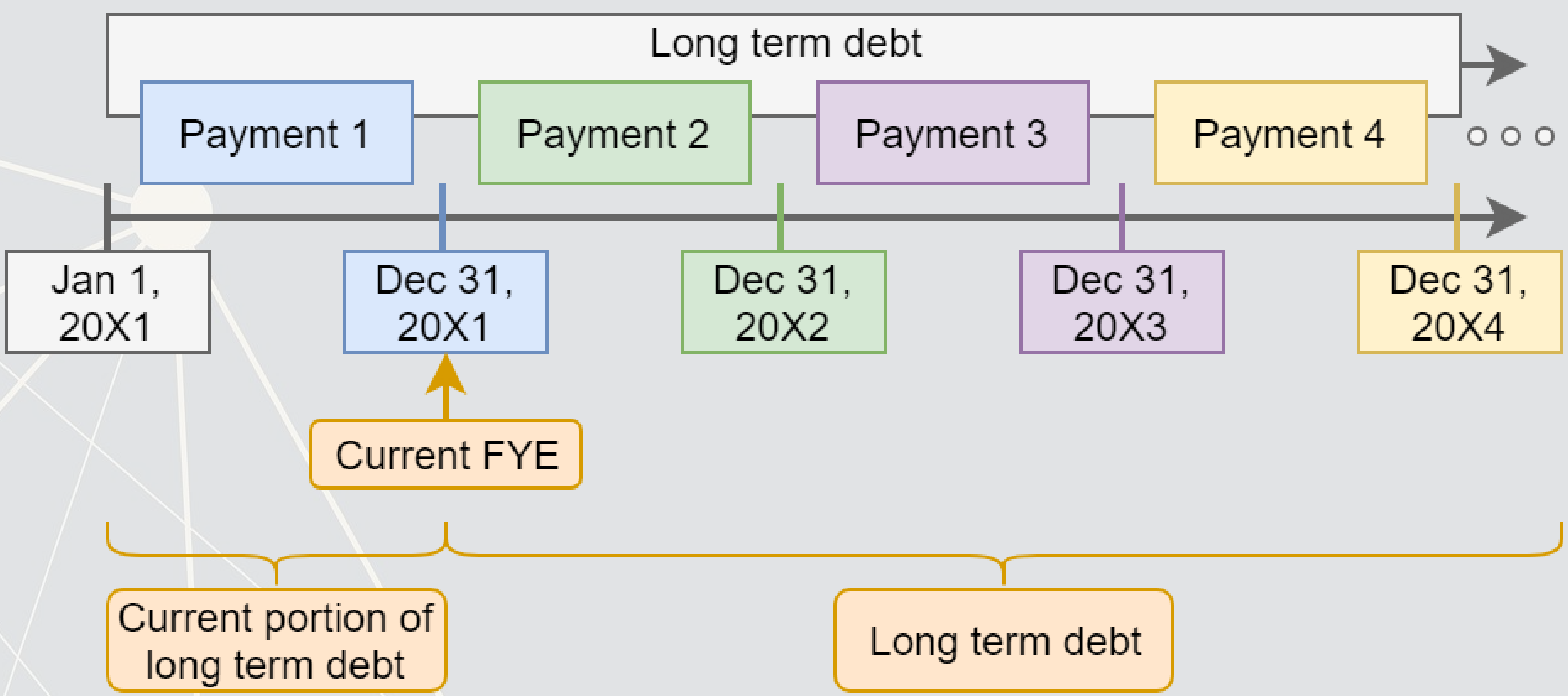
> Gave $2,000 with 9% interest due in 3 months payable to our customer as a note receivable.

Example: Note receivable

Date	Account	DR	CR
20Y8.12.01	Notes receivable	2,000	
	Cash		2,000
Gave $2,000 to a customer as a note receivablefrom supplier			
20Y8.12.31	Interest receivable	15	
	Interest revenue		15
Recorded accrued interest revenue on note receivable; 2,000 x 9% x 1/12			
20Y9.02.28	Cash	2,045	
	Interest revenue		30
	Interest receivable		15
	Notes receivable		2,000
Got paid for note receivable, with interest of 2,000 x 9% x 3/12 (1 month recorded prior)			

Current long term debt

- We consider any payment owed in the coming fiscal year as a current liability
  - This includes payments on long term debt
- We shift these payments to short term debt when we do our balance sheet
  - Call it “current portion of long term debt”



Check

> Coffee Co. gives $1,000 to Latte Inc. on November 1st, 20X8 as a note with 6% interest over 6 months. Record the journal entries for *both companies*, i.e., the note receivable and the note payable. Assume December 31st is both companies' fiscal year end.

- Hints:
  - Money changes hands on November 1
  - Interest accrues on December 31
  - The note is paid back on April 30th

Estimated liabilities

Provision for warranty repairs

- Manufacturers need to factor in liabilities from warranties
- Estimate this *provision for warranty repairs* at year end

Example: Warranty repairs

Date	Account	DR	CR
20YY.MM.D1	Warranty expense	1,000	
	Provision for warranty repairs		1,000
Accrued warranty expense for estimated warranty repairs			

20YY.MM.D2	Provision for warranty repairs	50	
	Inventory		50
Replaced a defective product sold under warranty			

What does contingent mean?

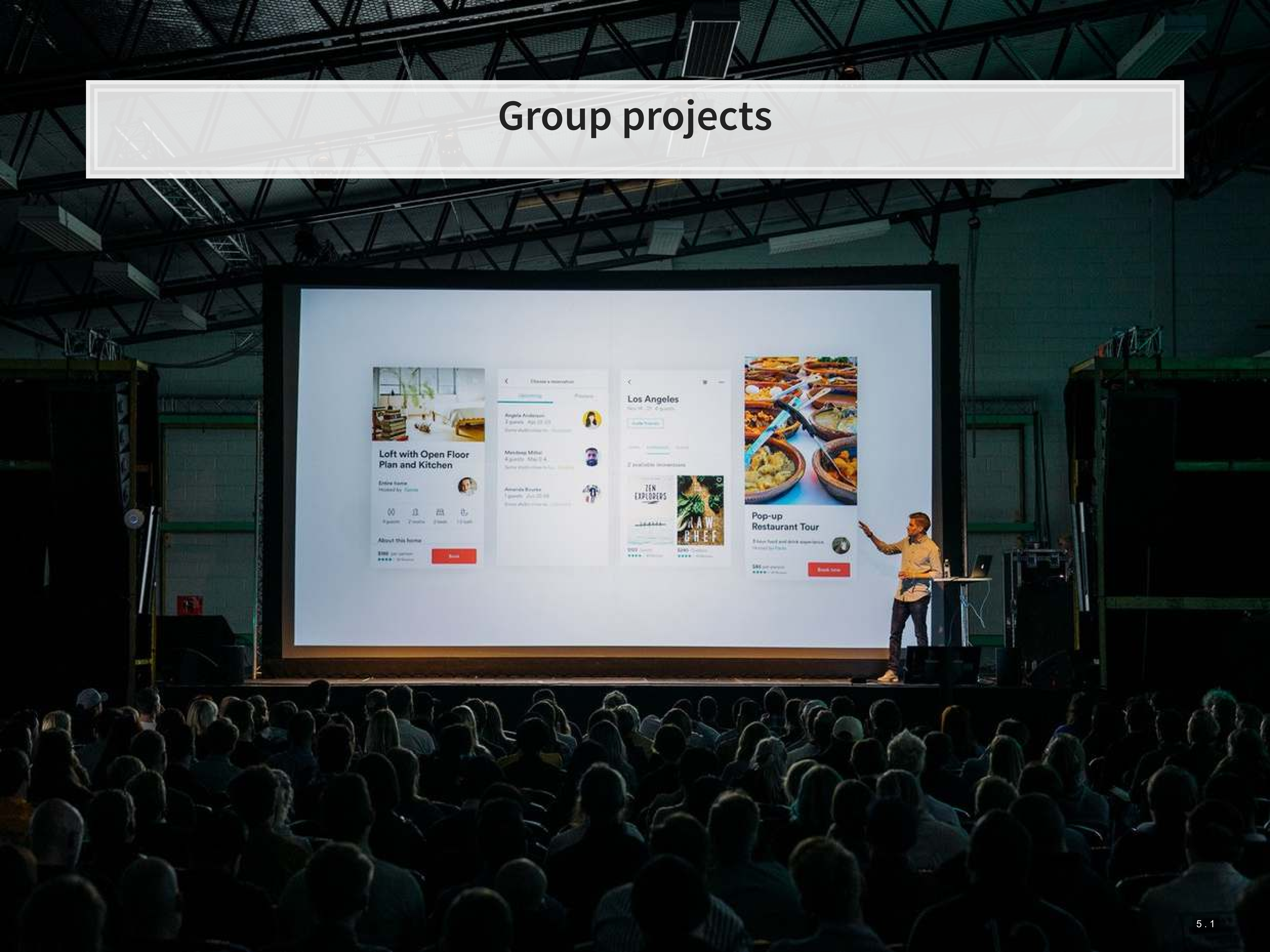
- Contingent liabilities are not presently liabilities, but could become liabilities in the future.
- Listed in the financial statement notes, but not journalized
- To note all 3 must be true:
  1. Must depend on a future outcome of past events
  2. May, *but probably will not*, require an outflow of resources
  3. Must not have a sufficiently reliable estimate of the amount owed.

> Contingent liabilities are obligations you might or might not have

Recognizing liabilities

- If chance of owing is very low
  - Ignore
- If chance is reasonably possible
  - *Contingent liability* $\Rightarrow$ Make a note to your financial statements, but don't include it in the statements themselves
- If a sufficiently reliable estimation can be made
  - This is a *real liability* $\Rightarrow$ Include it in your adjusting entries
    - Not as a contingent liability
  - Ex.:
    - Provision for warranty repairs

Group projects



Group projects

- Groups will be determined at random
  - Uses a custom, game theory based algorithm to ensure fairness while optimizing to your preferences based on simulation

> The bottom line: If you both pick each other, it's much more likely you'll be in the same group

- Present a topic of your choice from a list of 15+ topics covering (example below):
  - JV, M&A, International business, Current issues in IFRS, Fraud

> Your deliverable will be a 15 minute presentation, graded on content (75%) and presentation delivery (25%).

Time value of money

Source

This section is based on:

Corporate Finance: An Introduction

by Ivo Welch

Pearson: Boston, MA. 2009.

> It’s a good finance textbook!

The perfect market

- No taxes
- No transaction costs
  - Can find buyers/sellers costlessly
  - Can deliver costlessly
- Everyone has identical beliefs
- Many buyers and sellers (liquid)

> We'll use these assumptions in this class

Basic perspectives: Why we have *time value of money*

1. You can earn interest on $1 today, so it's worth more than $1 tomorrow.
2. Inflation means that $1 tomorrow can buy less than $1 today.
3. $1 today gives me the option to spend today or tomorrow, but $1 tomorrow can only be spent tomorrow. If that option is valuable to me, $1 today is worth more than $1 tomorrow.

> All three of these are equivalent: a dollar today is worth more than a dollar tomorrow

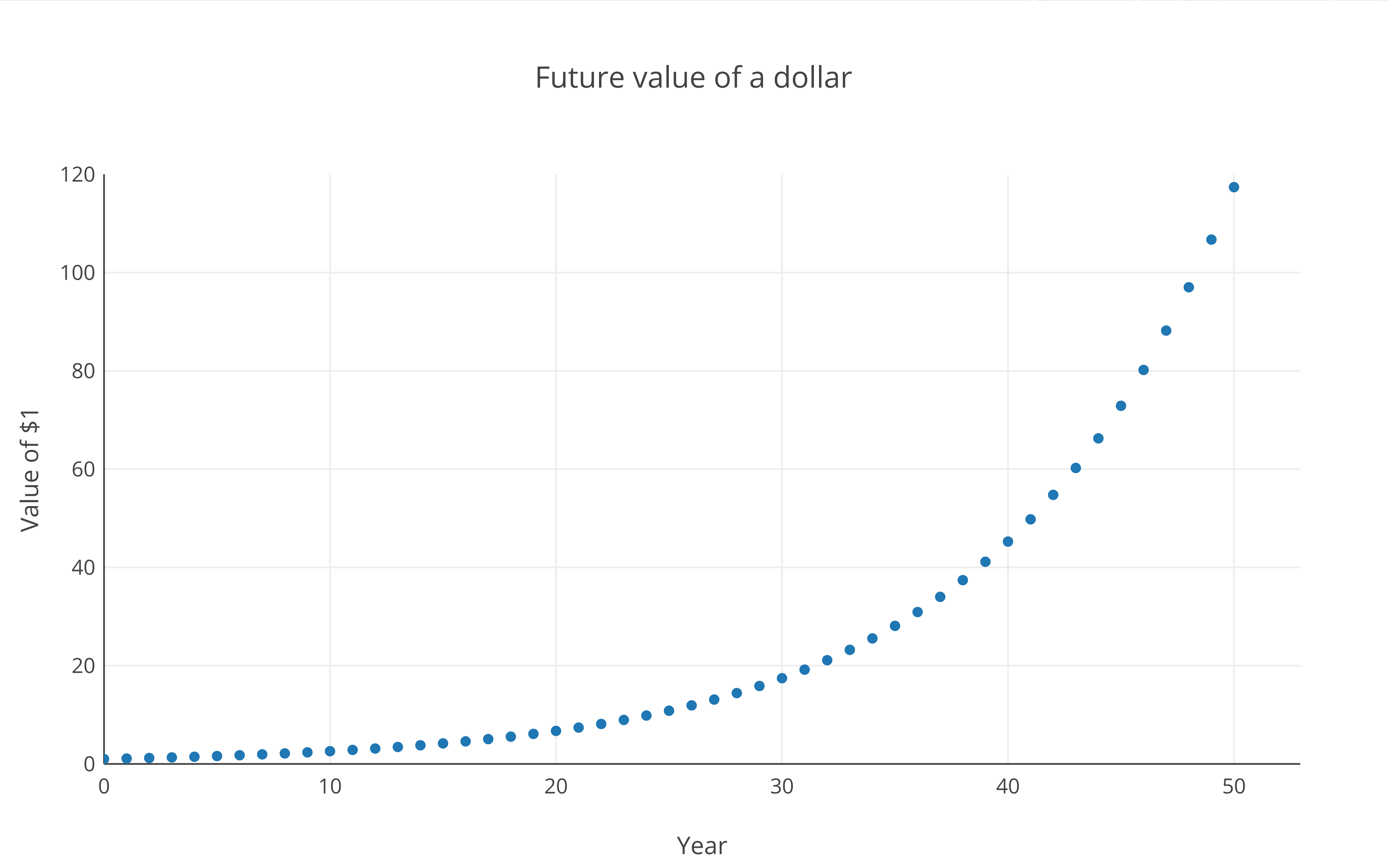
Consequences

- When we talk about returns, we'll talk about *compounded* returns
  - If \$1 today is \$1.10 next year…
    - then \$1.00 in two years is \$1.21, not \$1.20
      - Return scales with capital
- More explicitly: if the interest rate, r is 10%, and the principal, P_0 is \$1, then:
  - Tomorrow P_0 is worth $P_1 = P_0 \cdot (1 + r) = 1 \cdot 1.10 = 1.10$
  - Flipping the equation implies: $P_0 = \frac{P_1}{(1+r)} = \frac{1.10}{1.1} = 1$

Extension: Going forward

- What is \$1 worth in two years? Three years? …
  - $P_2 = (1 \cdot 1.1) \cdot 1.1 = 1.21$
  - $P_3 = ((1 \cdot 1.1) \cdot 1.1) \cdot 1.1 = 1.331$
  - $\ldots$
  - $P_{50} = (\ldots(1 \cdot 1.1) \cdot 1.1 \ldots) \cdot 1.1 \approx 106.72$
  - $\ldots$
  - $P_n = P_0 \cdot (1 + r)^n$

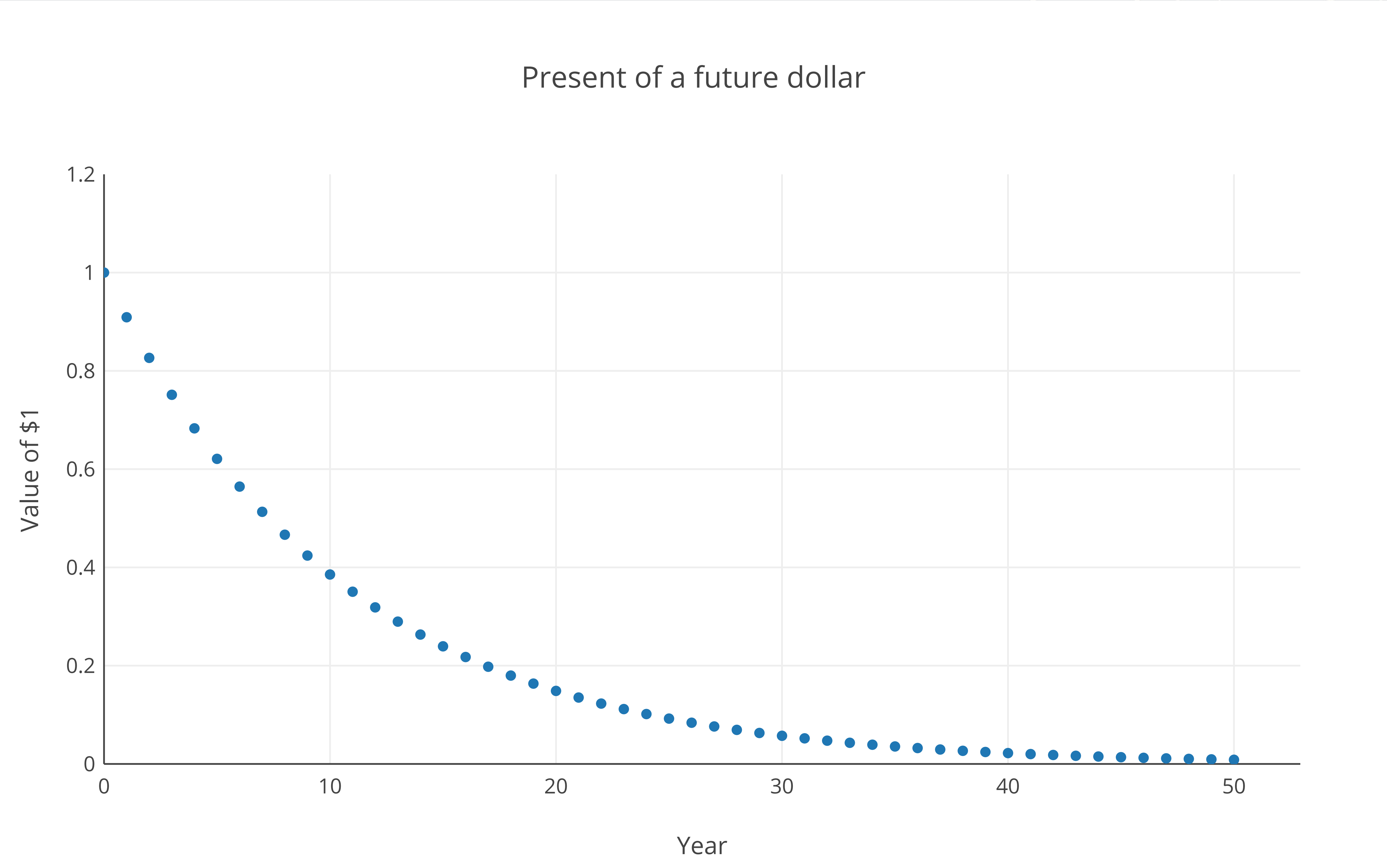
Extension: Going forward



Extension: Going backward

- What is the current value of \$1 in two years? Three years? …
  - $P_0'' = (1/1.1)/1.1 = 0.83$
  - $P_0''' = ((1/1.1)/1.1)/1.1 = 0.75$
  - $\ldots$
  - $P_0^{(50)} = (\ldots(1/1.1)/1.1\ldots)/1.1 \approx 0.0085$
  - $\ldots$
  - $P_0^{(n)} = \frac{P_n}{(1+r)^n}$

Extension: Going backward



Check

1. What is $10 worth in 20 years, if the interest rate is 5%?
2. What is $10 received 20 years from now worth today, if the interest rate is 5%?

Answers:

1. $10 \times (1 + 0.05)^{20} = \$26.53$
2. $\frac{10}{(1+0.05)^{20}} = \$3.76$

Net Present Value

What is Net Present Value? (NPV)

- What we just did!
- Determine the price *today* of some future (expected) cash flows
- Numerator is the future cash flow, CF
- Denominator is the *discount factor*, R
  - That is, we discount cash flows by the return to get today's value

$$NPV_0 = CF/R$$

- What if there are multiple cash flows?

$$NPV_0 = \sum_{i=0}^{n} \frac{CF_i}{R_i}$$

> NPV at time 0 (today) is the sum of all discounted cash flows

Discount factors

- The discount factor is the amount of *cumulated* return or interest you would expect to receive between two period of time.
- We often assume a fixed discount rate for each year of $1+r$
- Let R_i denote the discount factor from time 0 to time i
  - $R_1 = 1 + r$
  - $R_2 = (1+r) \cdot (1+r)$
  - $R_3 = (1+r) \cdot (1+r) \cdot (1+r)$
  - $\ldots$
  - $R_n = (1+r)^n$

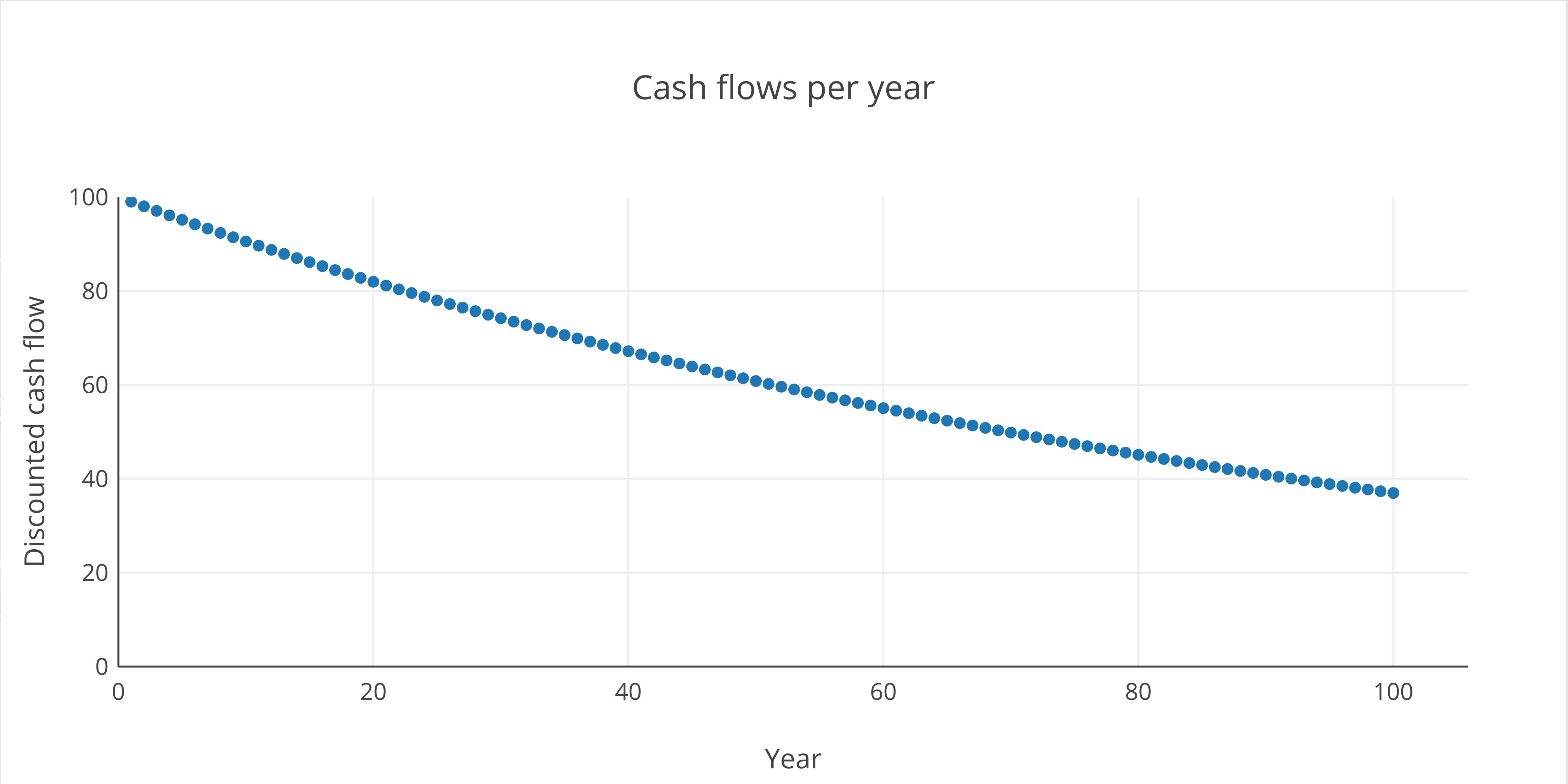
Simple Example

- A project costs \$500 today, and is expected to pay out the following:
  - \$100 in one year
  - \$600 in two years.
- If the interest rate is 10%, what is the NPV of the project?

  - $NPV = \frac{-500}{(1+0.1)^0} + \frac{100}{(1+0.1)^1} + \frac{600}{(1+0.1)^2}$
  - $NPV = -500 + 90.91 + 495.87$
  - $NPV = 86.78$
  - What if the interest rate was 5%?
  - $NPV = \frac{-500}{(1+0.05)^0} + \frac{100}{(1+0.05)^1} + \frac{600}{(1+0.05)^2}$
  - $NPV = -500 + 95.24 + 544.22$
  - $NPV = 139.46$

Calculating

- Easy to do a few cash flows with a calculator
- Easy to do any number of cash flows with spreadsheets
- What is the NPV of a project that pays out $100 each year for 100 years, assuming the interest rate is 1%?
  - Value is 6302.8878767



What about for…

- 10 years? 100 years? 1,000 years? 10,000 years?
- Pretty hard by hand
- Trivial to brute force on a computer

In R:

```
NPV <- data.frame(Years=c(10, 100, 1000, 10000),
                  NPVs=c(sum(c(100/1.01^(1:10))),
                         sum(c(100/1.01^(1:100))),
                         sum(c(100/1.01^(1:1000))),
                         sum(c(100/1.01^(1:10000)))))
html_df(NPV)
```

Years	NPVs
10	947.1305
100	6302.8879
1000	9999.5229
10000	10000.0000

What about by hand?

Formulas!

- Perpetuity: THE same cash flow and discount rate forever:
  - $Perpetuity\ NPV = \frac{CF}{r}$
- Growing perpetuity: perpetuity but with a growth in cash flows of g:
  - $GP\ NPV = \frac{CF}{r-g}, g < r$
- *Annuity*: same cash and discount rate for only T periods
  - $Annuity\ NPV = \frac{CF}{r}\left[1 - \frac{1}{(1+r)^T}\right]$

We'll need this annuity NPV formula next class

Revisiting the 10,000 figures

$$\begin{aligned} NPV &= \frac{100}{0.01} \cdot \left[1 - \frac{1}{(1+0.01)^{10,000}}\right] \\ &\approx 10,000 \cdot 1 \\ &\approx 10,000 \end{aligned}$$

- What about for 70 periods?
  - $NPV = \frac{100}{0.01} \cdot \left[1 - \frac{1}{(1+0.01)^{70}}\right]$
  - $NPV = 5,016.85$

The last formula…

> ### A note to those in finance, from the textbook:
> I am not a fan of memorization, but you must remember the growing perpetuity formula. It would likely be useful if you could also remember the annuity formula. These formulas are used in many different contexts. There is also a fourth formula, which nobody remembers, but which you should know to look up if you need it. (p53)

- Growing annuity

$$PV = \frac{C}{r-g}\left[1 - \frac{(1+g)^T}{(1+r)^T}\right], g < r$$

Derivation – for those interested in the math

You can derive the other 3 formulas from the fourth:

- Growing perpetuity:
  - $\lim_{T\rightarrow\infty} \frac{CF}{r-g}\left[1-\frac{(1+g)^T}{(1+r)^T}\right] = \frac{CF}{r-g}[1-0] = \frac{CF}{r-g}$
- Annuity:
  - $\frac{C}{r-g}\left[1-\frac{(1+g)^T}{(1+r)^T}\right]\Bigg|_{g=0} = \frac{C}{r}\left[1-\frac{1}{(1+r)^T}\right]$
- Perpetuity
  - $\lim_{T\rightarrow\infty} \frac{CF}{r-g}\left[1-\frac{(1+g)^T}{(1+r)^T}\right]\Bigg|_{g=0} = \frac{CF}{r-0}[1-0] = \frac{CF}{r}$

You don't need to know this for this class

In class work

1. An investment costs \$100 today, and pays out \$10 per year for the next 10 years. In the 10th year, it also pays back the original \$100. If the interest rate is 10%, what is the NPV?
2. What if the interest rate was 8% instead of 10% in #1?
3. Go back to #1, but assume there is a 20% chance you'll never get any money after paying 100. How much extra needs to be added to the yearly payments for the NPV to remain at 0?
   - I.e., if you pay 100 now:
     - There's a 20% chance you get nothing in return
     - There's a 80% chance you get the yearly payments and the final payout.

Stock markets

- Are stock prices NPVs?

End matter

For two weeks from now

- Reading
  - Chapter 9 (Liabilities)
  - Tricky subject, reading highly recommended
- Extra practice available
  - Time value of money
- Have a great break!