FN 201 BUSINESS FINANCE

Lecture 1

Topics: Introduction to Finance, Time Value of Money

Agenda

- Instructor
- Course outlines and descriptions
- What is and who does Finance?
- Time Value of Money (TVM)
  - Future Value (FV)
  - Present values (PV)
  - Interest rate terminology
- Annuity / Perpetuity

Sukonpat Chantapant, aka, "Ajarn K"

- Education:
  - BSc in Economics at Australian National University (ANU), Australia with Honour
  - MSc in Computational Finance at Carnegie Mellon University, U.S.
  - Both under BOT Scholarships
- Certificate:
  - Financial Risk Manager (FRM)
- Experiences:
  - Bank of Thailand 10 yrs
    - Financial Institutions Supervision Group : Risk Management System Examination & Stress Testing Team
  - Rothchild Asset Management, New York (Internship program.)
    - Equity risk modeling

- Teaching Experience:
  - FN413 Strategic Financial Management (1S)
  - FN201 Business Finance (8S)
- Areas of interests:
  - Risk management (credit, market and liquidity risks)
  - Financial institutions and regulations
  - Options and option pricing
  - Credit Risk Modelling
- Publication (Bank of Thailand Economic Symposium 2007, 2011):
  - "Are Thai Banks Vulnerable? : A Structural Analysis of Bank Corporate Loan Portfolios and Implications" by Don Nakornthab , Krongkaeo Kritayakirana and Sukonpat Chantapant
  - "Dealing with structural changes: a Diagnosis of the Thai Economy" by Kiatpong Ariyapruchya, Sukonpat Chantapant, Tosapol Apaitan

Course outlines and descriptions

- Details in handout
- My style of teaching
  - Learn finance like economists
  - Emphasize on having the right intuition and logics as well as ability to produce correct answer
  - Learning by doing many exercises
- Grading

FN201 will form a foundation for further elective courses in finance

- FN 201 Business Finance
- FN 211 Financial Markets
- FN 311 Financial Management
- FN 312 Investment

- FN 241 Risk Management and Insurance
- FN 313 International Financial Management
- FN 331 FI Management
- FN 421 Financial Statement and Reporting Analysis
- FN 426 Financial Derivatives
- FN 428 Investment Banking
- FN 413 Strategic Financial Management

Who does and what is finance?

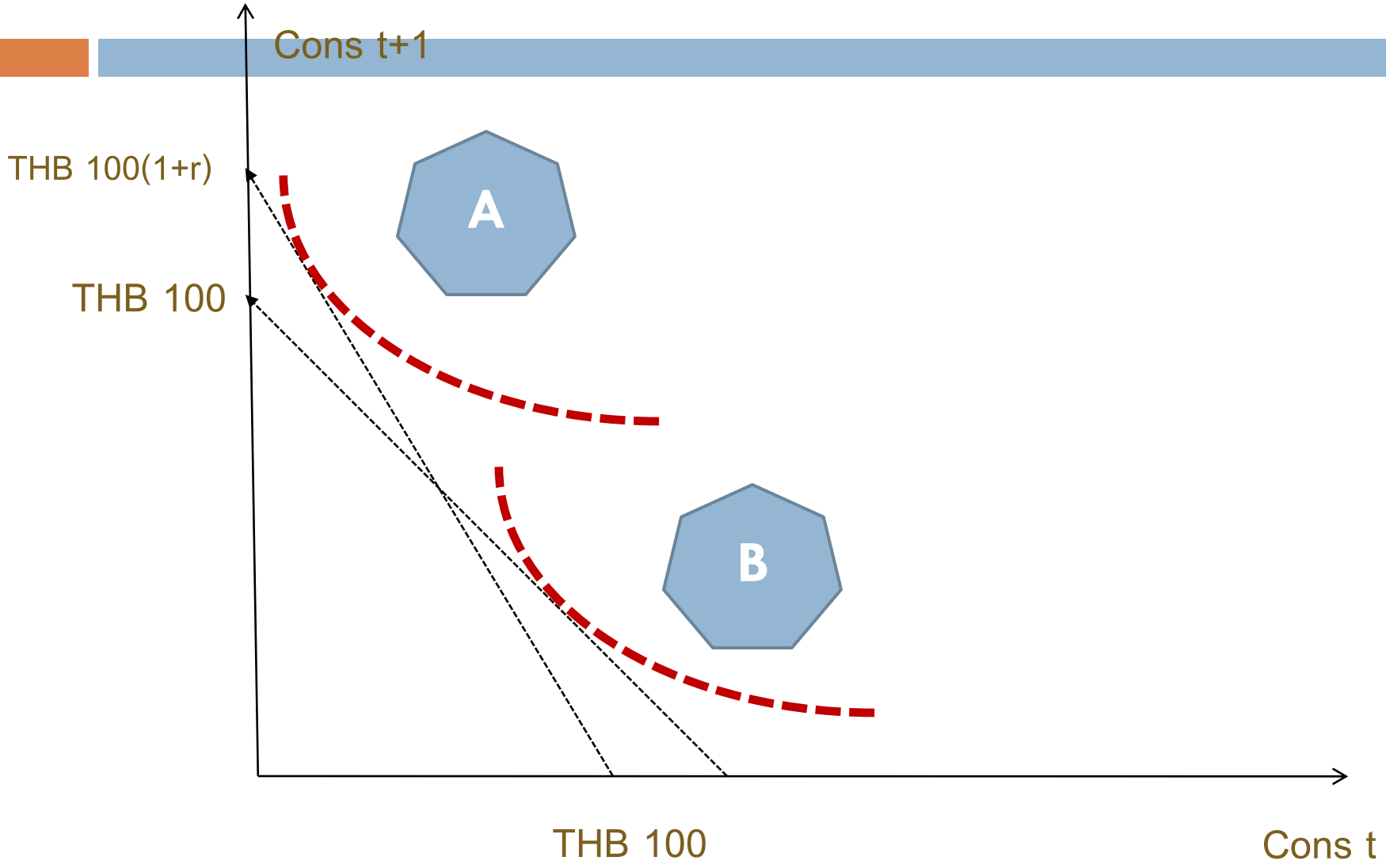
- What is Finance?
  - Finance = the allocation of resources across time and risk

- Who does finance?
  - Individual: make savings & investment choices:

    (1) individual save/borrow and invest to adjust consumption → across time

    (2) individual invest or hedge against future risk to adjust consumption → across state of nature

Individual Budget Line



Who does and what is finance? (2)

- Who does finance?
  - Firms / Corporations: Investment & Financing Choices
    - (1) firm decide whether to invest in project to generate return → across time & → across state of nature
    - (2) firm decide how to "finance" such project → across time & → across state of nature

Finance is about Discounting Cash Flows

Common-sense approach to investment decision?

- For example
  - If you have THB 100,000 to invest, would you invest in recently-issued Thai government 5yrs bond?
    - What information required to make an informed decision?
  - If project A is expected to generate a return of 10% and a similar project would yield a return of 7% or 15%, would you invest in the project A?
    - What information required to make an informed decision?

Time Value of Money (TVM)

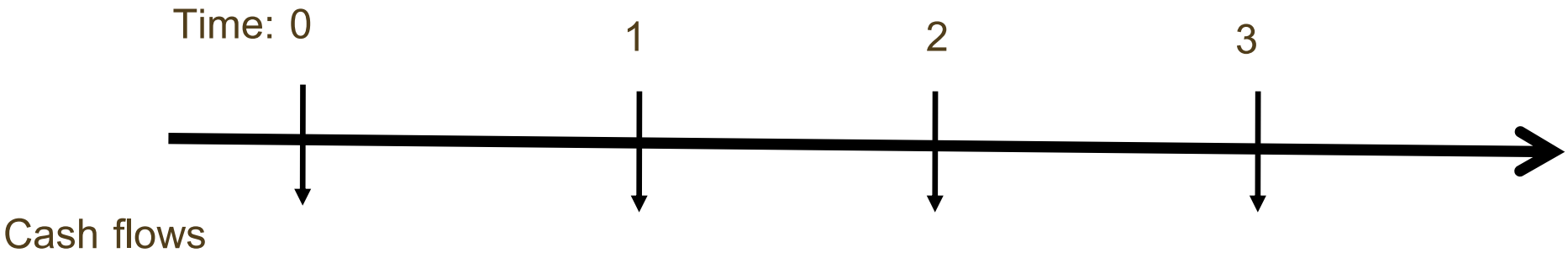
- Which one is preferred?
  - 1) THB100 received today
  - 2) THB100 received 10 days from now

- Which one is preferred?
  - 1) Invest THB100 in government bond with return of 5%
  - 2) Invest THB100 in stock market with possible return of 5%
  - 3) Gamble in Casino THB100 with possible return of 5%

Time Value of Money (TVM) - 2

- Key principles of finance
  - 1) A dollar today is worth more than a dollar tomorrow
  - 2) A safe dollar is worth more than a risky one

Our main weapon – time line tool



Present Value (PV) & Future Value (FV)

- Present Value vs Future Value

- Discounting vs Compounding

Interest Rate Terminology

Interest Rate Terminology

- What is the average rate of return?

- Simple interest vs Compound interest

Interest Rate Terminology

- 1) Nominal interest rate (i_{Nom})
  - Or quoted rate (i_{Quoted})
  - Interest rate usually quoted in terms of Annual Percentage Rate (APR)
  - Must be accompanied by the number of compounding periods per year

$$i_{Per} = i_{Nom} / m$$

- 2) Periodic rate (i_{Per})
  - The rate paid in each period or rate per compounding interval
  - m = # of compounding periods per year

Future Value

- If invest C in a bank account with a return i_{nom} per year, how much would you have after 1 yr, 2 yr,..., t yr?

$$FV = C\left(1+\frac{i_{nom}}{m}\right)^{mt}$$

How many times it get compounded

$I_{per} = i_{nom} / m$

- If rate compound continuously
  - Use i_{nom} not i_{per} because the time factor (t) wi

$$FV = Ce^{i_{nom}*t}$$

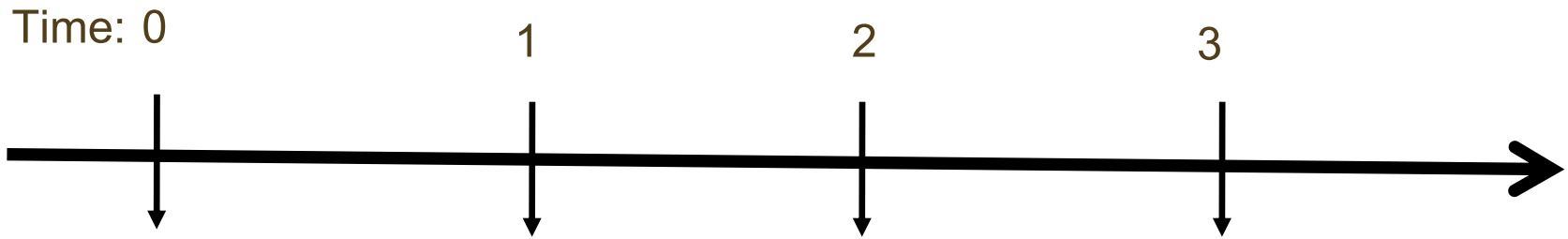
Ex1: Cal FV

- Cal. future value of THB 100 invested for 1,5,10,30 years at 10% compounded m times per year
  - Compounding frequency does matter

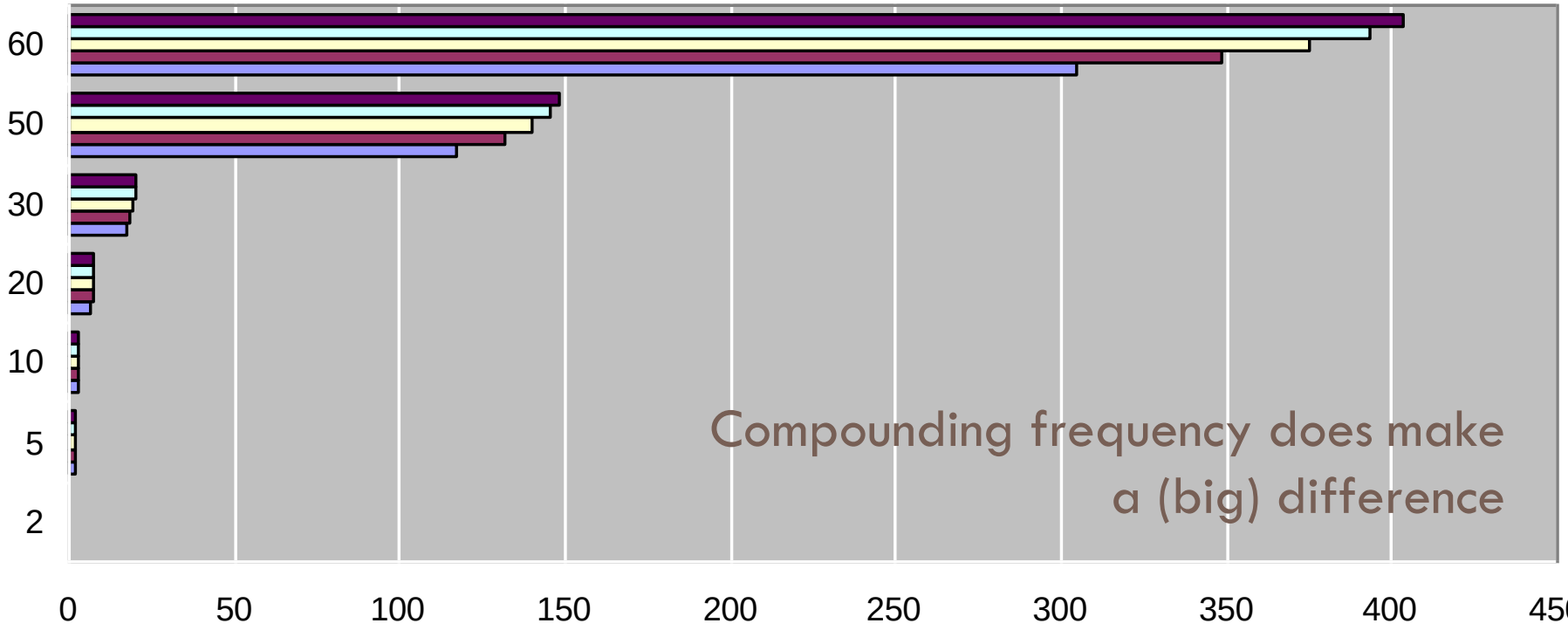
m times per year	t years			
	1	5	10	30
1	110.00	161.05	259.37	1,744.94
2	110.25	162.89	265.33	1,867.92
4	110.38	163.86	268.51	1,935.81
12	110.47	164.53	270.70	1,983.74
365	110.52	164.86	271.79	2,007.73
infinity	110.52	164.87	271.83	2,008.55

Ex2: Cal PV

How PV and FV look like on time line tool?



Cash flows



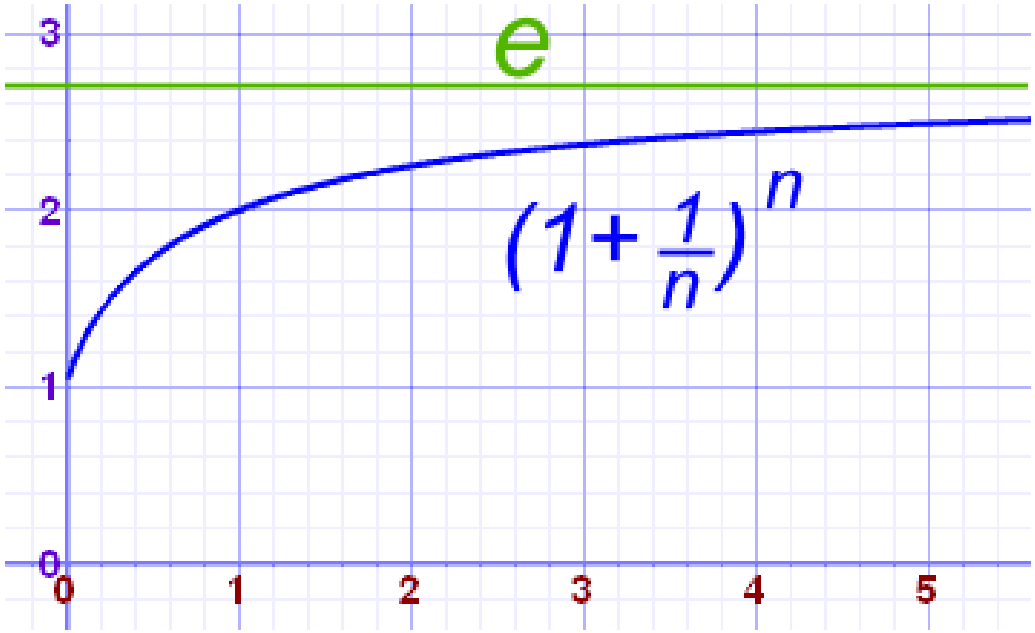
	2	5	10	20	30	50	60
Infinity	1.221	1.649	2.718	7.387	20.077	148.312	403.097
Daily	1.220	1.645	2.707	7.328	19.837	145.370	393.522
Quarterly	1.218	1.639	2.685	7.210	19.358	139.564	374.738
Semi-Annual	1.216	1.629	2.653	7.040	18.679	131.501	348.912
Annual	1.210	1.611	2.594	6.727	17.449	117.391	304.482

Annual Semi-Annual Quarterly Daily Infinity

Continuous Compounding & Euler Number (1)

- e -> Euler's number
  - Named after Leonhard Euler
  - The value of (1+1/n)^n approaches [e] = 2.7 1828 1828 45 90 45

n	$(1 + 1/n)^n$
1	2
2	2.25
5	2.48832
10	2.59374246
100	2.704813829
1,000	2.716923932
10,000	2.718145927
100,000	2.718268237



  - e also equals to 1 + 1/1! + 1/2! + 1/3! + 1/4! + 1/5! + 1/6! + 1/7! +…..

Continuous Compounding & Euler Number (2)

- Continuous compounding

n	$(1 + r/n)^n$	exp(r) r=10%
1	1.1	
2	1.1025	
5	1.104080803	
10	1.104622125	
100	1.105115698	
1,000	1.105165393	
10,000	1.105170365	
100,000	1.105170863	1.105170918

- Approximation works quite well

Which one is preferred?

- Case 1
  - Plan A: I = 10%, m =4
  - Plan B: I = 11%, m =4
- Case 2
  - Plan A: I = 10%, m =4
  - Plan B: I = 9.9%, m =8
  - Plan C: I = 9.7%, m = 365

Interest Rate Terminology

- 3) Effective annual rate (EAR)
  - Annual rate that produces the same result as if it compound once a year
  - Rate effectively earned

$$EAR = i_{effective} = \left(1 + \frac{i_{Nom}}{m}\right)^{m} - 1$$

$$EAR = i_{effective} = \exp(i_{Nom}) - 1$$

Ex3: Compute EAR

- Find EAR for 10% semiannual investment

  $i_{Per} = i_{nom} / m$

  - EAR $= (1 + i_{Nom} / m)^m - 1$
    $= (1 + 0.1 / 2)^2 - 1$
    $= 10.25\%$

Compounding	m	EAR
Annual	**1**	
Semiannual	**2**	
Quarterly	**4**	
Monthly	**12**	
Daily (365)	**365**	
Infinity	**Inf…**	

Ex4: Compute EAR

- I = 5.00% & m =1
- I = 4.95% & m =2
- I = 4.90% & m =4
- I = 4.85% & m = 32
- I = 4.70% & m = infinity

Ex5: Test of concept

- 4.1 Which of the following statements is true?
  - a. The process of discounting is the inverse of the process of compounding
  - b. Present value of an annuity due is always less than the present value of an equivalent annuity at positive interest rates
  - c. Both are true
  - d. Both are false

- 4.2 The concept of compound interest is most appropriately described as:
  - a. Interest earned on an investment
  - b. The total amount of interest earned over the life of an investment
  - c. Interest earned on interest
  - d. None of the above

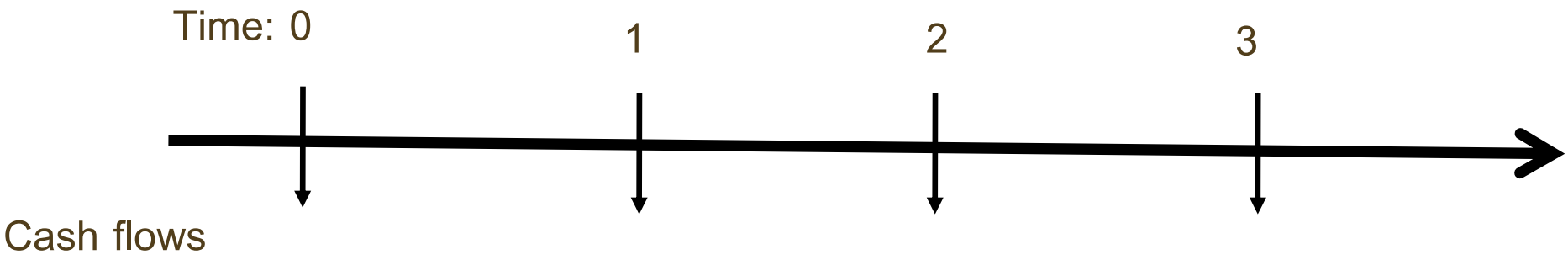
Recall the formula

$$FV = C\left(1 + \frac{i_{nom}}{m}\right)^{mt}$$

$$FV = PV\left(1 + \frac{i_{nom}}{m}\right)^{mt}$$

$$PV = \frac{FV}{\left(1 + \frac{i_{nom}}{m}\right)^{mt}}$$

How would it look like on time line tool?



Ex6: Test of concept

- If the interest rate is 12%, what is the 2-year discount factor?
  - a. 0.7972
  - b. 0.8929
  - c. 1.2544
  - d. None of the above

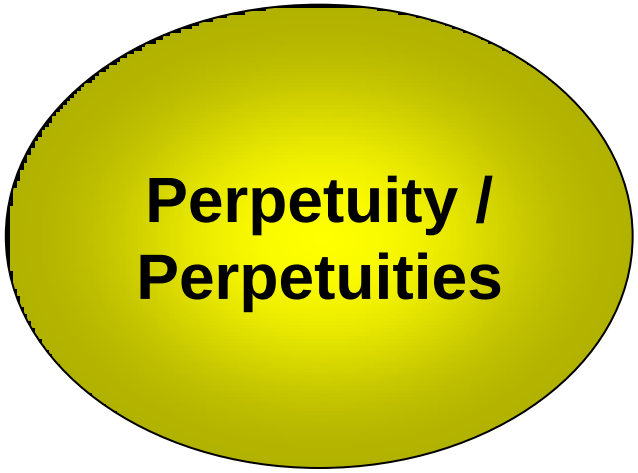
- If the present value of the cash flow X is $240, and the present value cash flow Y $160, then the present value of the combined cash flow is:
  - a. $240
  - b. $160
  - c. $80
  - d. $400

Ex7: Test of concept

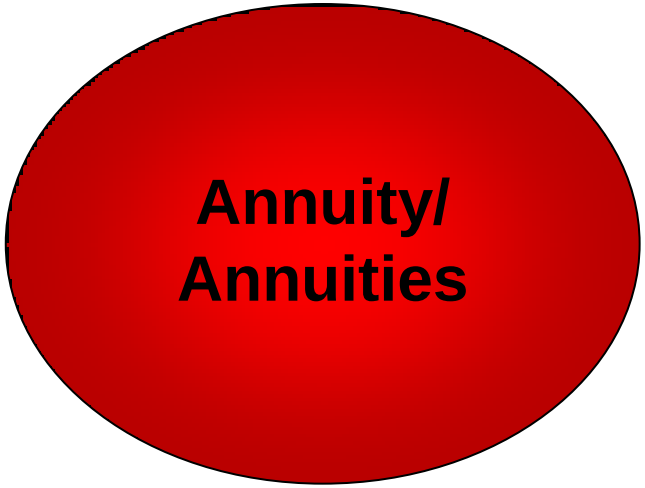
- At an interest rate of 10%, which of the following cash flows should you prefer?
  Year 1 Year 2 Year 3
  - a. 500 300 100
  - b. 100 300 500
  - c. 300 300 300
  - d. They are the same

Introduction to Annuities / Perpetuities

- Let's think about these financial problems
  - Find PV of a stream of (constant) cash flow, paid annually, forever
  - Find PV of a stream of (constant) cash flow, paid monthly, forever



  - Find PV of a stream of (constant) cash flow, paid annually, for X years
  - Find PV of a stream of (constant) cash flow, paid monthly, for X years



Perpetuities & Annuities (1)

- Perpetuities is a stream of periodic cash flows, starting at t=1, going forever

$$PV \text{ of perpetuities} = \frac{C}{i}$$

- Annuities is a stream of periodic cash flows, starting at t=1, going for a specified number of periods

$$PV \text{ of annuities} = \frac{C}{i} - \frac{C}{i(1+i)^t}$$

Perpetuities Formula

Annuities Formula

Think of Annuities as 2 perpetuities

Year	Cash flow 1	2	3	4	5	6	……	PV
1. Perpetuity A	$C	$C	$C	$C	$C	$C	…	$\frac{C}{i}$
2. Perpetuity B				$C	$C	$C	…	
3. Three-year annuity	$C	$C	$C					$\frac{C}{i(1+i)^3}$

$$PV = C[\frac{1}{i} - \frac{1}{i(1+i)^3}]$$

PV = C* Annuities Factor

This is an everyday financial problem

- Mortgage payment

- Car hire-purchase

- Installment loan for your new LCD

- Saving plan for retirement

Q&A