Entrepreneurship for Computer Science

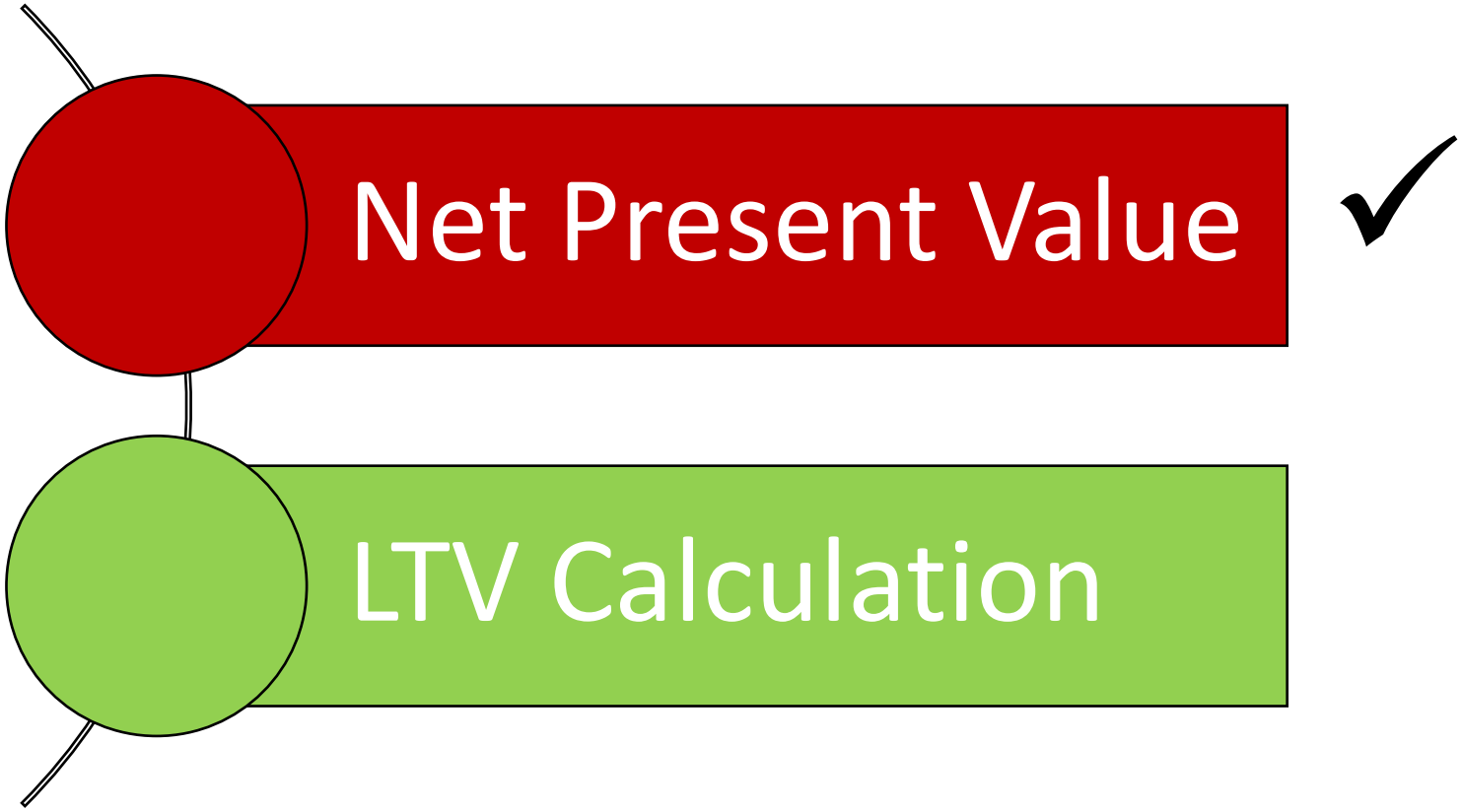
LTV- Part II

Lecture 10,

Today…

- Last Session:
  - Lifetime value of an acquired customer (LTV)- Part I
- Today's Session:
  - LTV- Part II
- Announcements:
  - PS2 is due on Feb 11 by midnight
  - Quiz 1 is on Feb 18
  - CP1 is due on Feb 27 by midnight. *Each team will be given 12 minutes to present its findings in class.*

Outline



Present Value: Recap

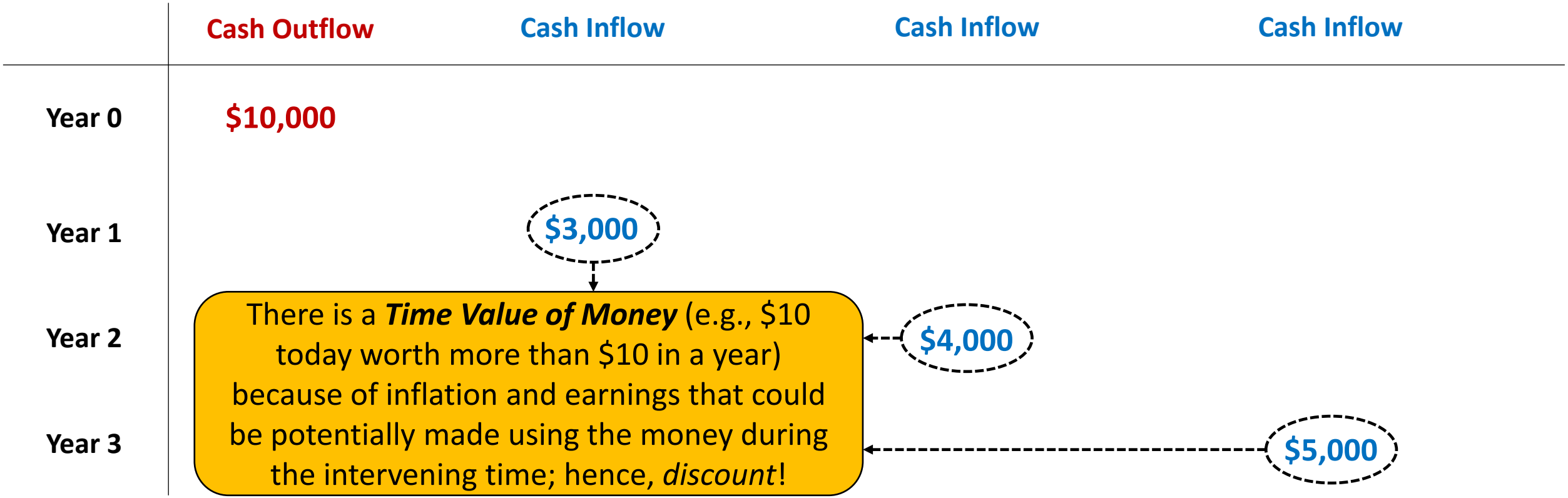
- *Present value* is the result of discounting *future value* to the present

- In general, its formula can be stated as follows:
  - $PV = FV/(1+r)^n$, where
    - PV = Present Value
    - FV = Future Value
    - r = Discount Rate (or *rate of return*)
    - n = Number of Periods, which could be in years, months, weeks, etc.

- Related to the concept of the *present value* is the ***net present value***

Net Present Value

- Assume you want to invest in a business $10,000
  - Can you pay off this investment in 3 years, assuming a discount rate of 5%?



Net Present Value

- Assume you want to invest in a business $10,000
  - Can you pay off this investment in 3 years, assuming a discount rate of 5%?

	Cash Outflow	Cash Inflow	Cash Inflow	Cash Inflow
Year 0	$10,000	$3,000/1.05 = $2857.14	$4,000/1.05^2 = $3628.11	$5,000/1.05^3 = $4319.18
Year 1		$3,000		
Year 2			$4,000	
Year 3				$5,000

Net Present Value

- Assume you want to invest in a business $10,000
  - Can you pay off this investment in 3 years, assuming a discount rate of 5%?

	Cash Outflow	Cash Inflow	Cash Inflow	Cash Inflow	$\sum Cash\ Inflows$
Year 0	$10,000	$2857.14	$3628.11	$4319.18	$10804.44
Year 1		$3,000			
Year 2			$4,000		
Year 3				$5,000	

Net Present Value

- Assume you want to invest in a business $10,000
  - Can you pay off this investment in 3 years, assuming a discount rate of 5%?

	Cash Outflow	$\sum$ *Cash Inflows*	($\sum$ *Cash Inflows*) − *Cash Outflow*
Year 0	**$10,000**	**$10804.44**	**$10804.44 – $10,000 = 804.44**
Year 1			
Year 2			
Year 3			

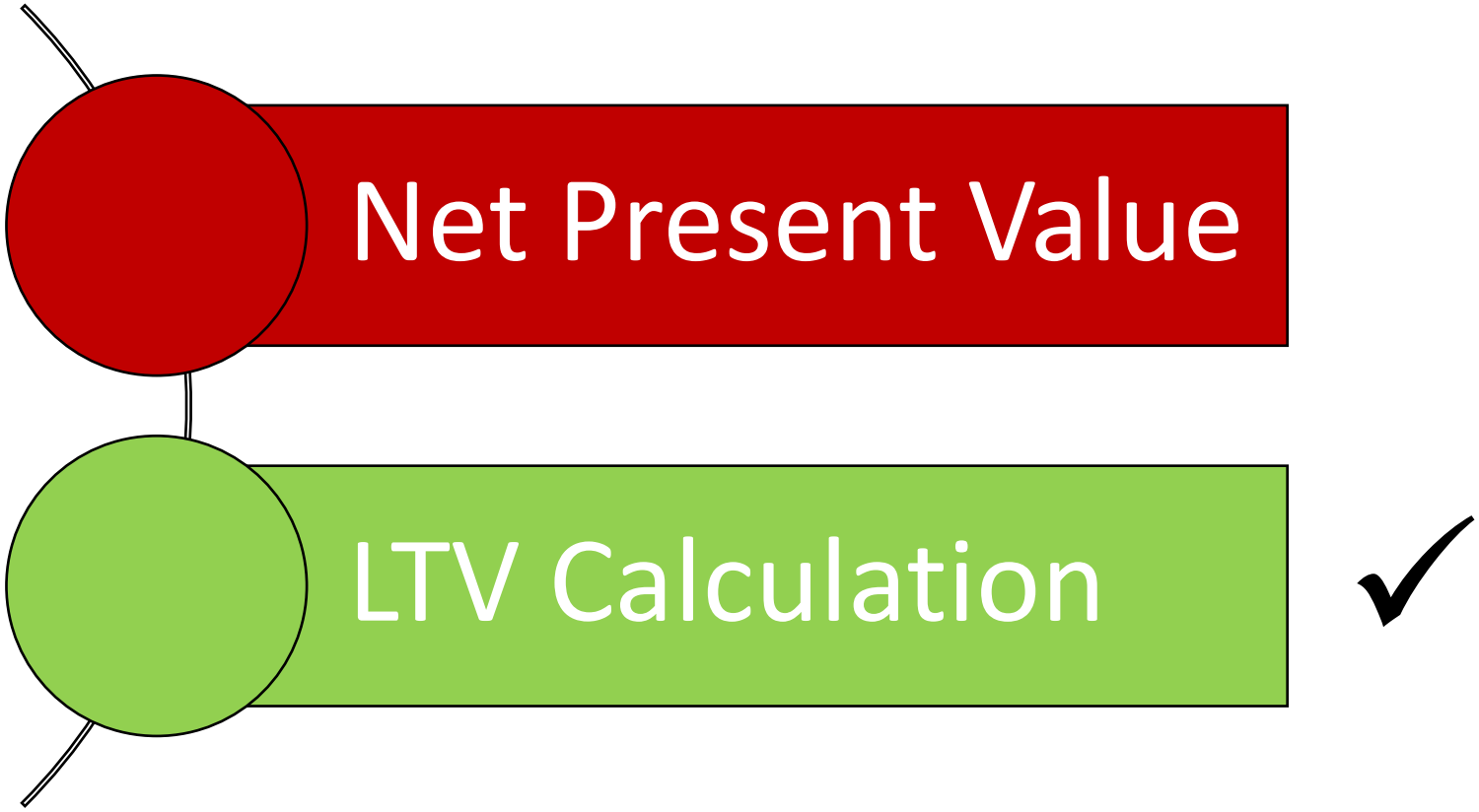
✓ YES, you can pay off your investment in 3 years

Net Present Value

- Net Present Value (NPV) is a *capital budgeting tool* that can be used to analyze the profitability of a projected investment or project
  - NPV = PV(All Cash Inflows) – PV(Cash Outflow)
  - If NPV > 0 accept; otherwise, reject!

- More formally, NPV = $\sum_{n=1}^{N} {C_n}/{(1+r)^n} - C_0$, where
  - N = Number of time periods
  - C_n = Net cash inflow during period *n*
  - C_0 = Net cash outflow (or total initial investment)
  - r = Discount rate

Outline



Key Inputs to Calculate LTV

1. Revenue channels
   - This depends on your business model
     - E.g., One-time, up-front revenue channel, *if any*
     - E.g., Recurring revenue stream, like subscription fee, maintenance fee, or purchases of consumables, *if any*
     - E.g., Additional revenue opportunities like revenue from add-on products, *if any*

2. Gross margin for each of your revenue channels
   - ***Gross margin = price – production cost***
   - **Note**: “Production” cost does not include sales, marketing, administrative, and overhead (e.g., R&D) costs

Key Inputs to Calculate LTV

3. Retention rate
   - This is the percentage of customers who will continue to pay for your product

4. Life of product
   - This is the duration you expect your product will last before the customer either discontinues using it or purchases a replacement

5. Next product purchase rate
   - This is the percentage of customers who will buy a replacement product from you when the life of the current product ends

Key Inputs to Calculate LTV

6. Cost of capital rate for your business
   - This is how much it costs you (in debt or equity) to get money from investors for your business (it is actually the *discount rate*)
   - For a new entrepreneur who lacks a track record and is just starting, an appropriate number is between 35% and 75% (also, *the riskier your venture is, the higher the number*)

How to Calculate LTV?

- **Algorithm**:

1. for each year ***y***
2. for each revenue channel in your business model
3. if in ***y*** the customer will replace your product
4. use "**gross margin**", "**retention rate**" (*if any*), and
5. "**next product purchase rate**" to calculate your profit ***p***
6. else
7. use "**gross margin**" and "**retention rate**" (*if any*)
8. to calculate your profit ***p***
9. total_profit += ***p***
10. calculate the ***present value pv*** of total_profit in ***y***
11. LTV += ***pv***
12. total_profit = 0

Example: “Widget”

- Assume a conceptual case of a company that makes a “widget”

- Widget’s business model involves a one-time, up-front charge for the widget, alongside an annual recurring fee for maintenance

	One-time Revenue	Recurring Maintenance Revenue
Widget Price	$10,000	15% of the up-front charge after a 6-month warranty period
Gross Margin	65%	85%
Retention Rate		100% in year 0 and 90% in subsequent years
Life of Product	5 years	5 years
Next Product Purchase Rate	75%	75%
Cost of Capital Rate	50%	50%

Towards Calculating LTV for “Widget”

- **Revenue Channel 1**: One-time, up-front payment for a widget
  - How much *profit* can be made out of this channel?

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Cost of a Widget	$10,000					$10,000
Next Product Purchase Rate						0.75
Gross Margin of a Widget	0.65					0.65
Profit from a Widget	(10,000×0.65) = $6,500					(10,000×0.75×0.65) = $4,875

Towards Calculating LTV for "Widget"

- **Revenue Channel 2**: Maintenance for a widget
  - How much *profit* can be made out of this channel?

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Cost of Maintenance	$750	$1500	$1500	$1500	$1500	$750
Retention Rate (say, r)	1	0.9	0.9	0.9	0.9	
Cumulative r (= r^y, where y = no of years after year 0)	1	$(0.9^1) = 0.9$	$(0.9^2) = 0.81$	$(0.9^3) = 0.729$	$(0.9^4) = 0.656$	0.656
Next Product Purchase Rate						0.75
Gross Margin of Maintenance	0.85	0.85	0.85	0.85	0.85	0.85
Profit from Maintenance	(750×1×0.85) = $637.5	(1500 × 0.9 × 0.85) = $1,147.5	(1500 × 0.81 × 0.85) = $1,032.75	(1500 × 0.729 × 0.85) = $929.48	(1500 × 0.656 × 0.85) = $836.40	= (750 × 0.656 × 0.75 × 0.85) = $313.65

Calculating LTV for “Widget”

- **Lifetime Value of An Acquired Customer (LTV)**:

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Profit from a Widget	$6,500					$4,875
Profit from Maintenance	$637.5	$1,147.5	$1,032.75	$929.48	$836.40	$313.65
Sum of Profits	$7,137.50	$1,147.5	$1,032.75	$929.48	$836.40	$5,188.65
Cost of Capital Rate	0.5	0.5	0.5	0.5	0.5	0.5
Present Values of Profits	$(7137/1.5^0)$ = $7,137	$(1147.5/1.5^1)$ = $765	$(1032.75/1.5^2)$ = $459	$(929.48/1.5^3)$ = $275.4	$(836.4/1.5^4)$ = $165.24	$(5188.65/1.5^5)$ = $683.285
LTV	**$9485.425**					

Important Considerations

- The business model decision is very important
  - Your choice of business model can greatly impact your LTV
    - Recurring income:
      - Pros: can increase revenue
      - Cons: might necessitate additional capital from investors up-front (especially, if there are no up-front charges); hence, potentially increase cost of capital
    - One-time, up-front charge:
      - Pros: can reduce the amount of capital needed initially; hence, potentially decrease cost of capital
      - Cons: might not appeal to customers

Important Considerations

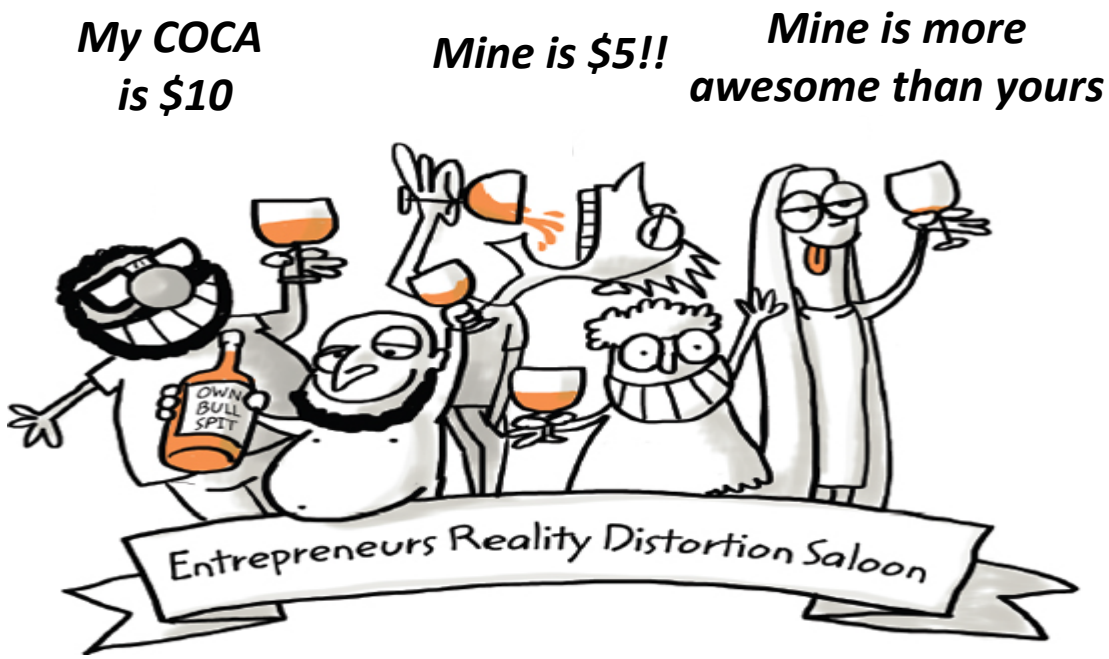
- LTV is about *profit*, not revenue
  - A common mistake among entrepreneurs is to tally up revenue (not profits) out of the business model channels
  - Gross margin (i.e., profit and NOT revenue) and cost of capital rate are integral to determining an accurate LTV

- Gross margins make a big difference
  - Try to wrap your potentially lower-margin core product with high-margin add-on products, services, or upselling opportunities (e.g., analytics reports, which might significantly appeal to customers!)
  - E.g., LARK started out with a silent alarm clock, which did not lead to sustainable business until they offered expert sleep analysis reports to end-users

Important Considerations

- Retention rates are critical as well
  - A small increase in your retention rate leads to a significant improvement in your cumulative profit
- Overhead costs are not negligible
  - To simplify LTV calculations, overhead costs (e.g., R&D and administrative expenses) are excluded
  - These costs might be high though!
  - Hence, LTV should be substantially larger than COCA

Cost of Customer Acquisition (COCA)



Cost of Customer Acquisition (COCA)

Optimism is good, but be careful not to blind you from the real cost of customer acquisition. It is essential that you do realistic calculations and then make appropriate adjustments over time.

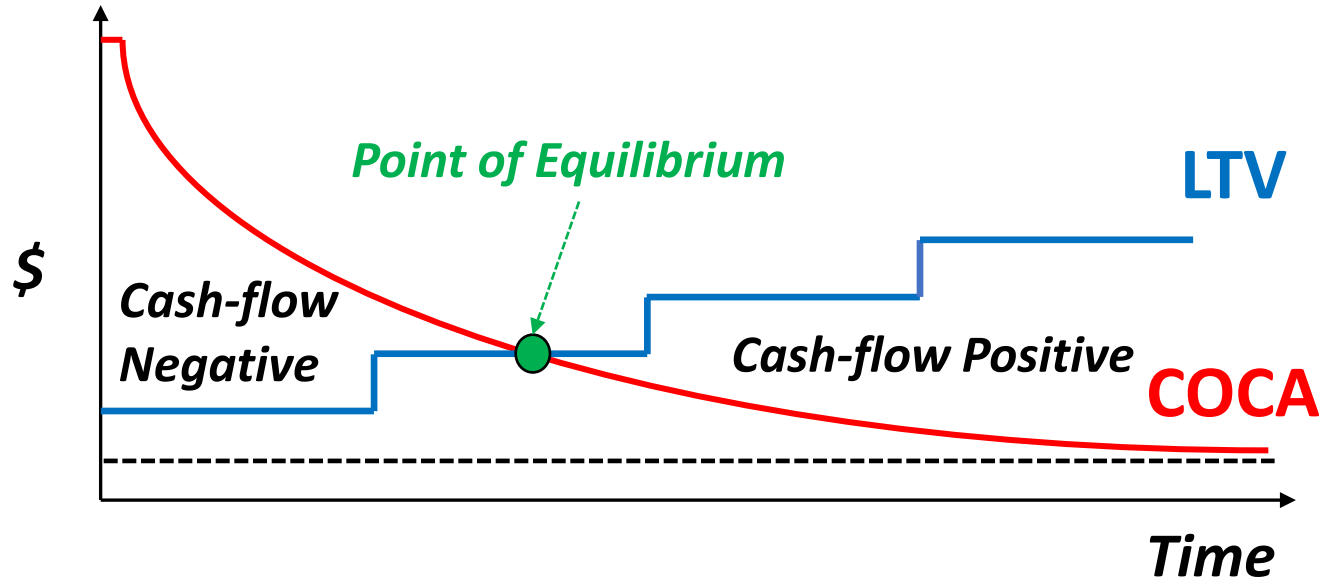
Cost of Customer Acquisition (COCA)

- How much does it cost you to bring a new customer to your product?
  - In other words, how much is your COCA?

- In calculating your COCA, you must quantify *all* the sales and marketing costs involved in acquiring a *single average* customer in steady state
  - Examples of sales and marking costs include salesmen salaries, admin support, travel, entertainment, trade shows, phone, Internet, website developments, computers, etc.,
  - This necessitates that you understand your sales process very well!
  - Production, R & D, finance and administrations, and any other overhead costs are not included

COCA vs. LTV

- For almost all new ventures, COCA will start very high and decrease over time (*opposite to LTV*)



How to Calculate COCA?

- To calculate COCA, you need three metrics:
  1. Total Marketing and Sales Expenses over Time or **TMSE(t)**
  2. Install Base Support Expense over Time or **IBSE(t)**
     - This is the cost to retain existing customers
  3. New Customers over Time or **NC(t)**

- COCA = (**TMSE(t)** – **IBSE(t)**)/**NC(t)**

- COCA is typically calculated over 3 consecutive time periods, namely, *short-term* (e.g., 1st year of sales), *medium-term* (e.g., 2nd and 3rd years of sales), and *long-term* (e.g., 4th and 5th years of sales) periods
  - Depending on your venture, these time periods may be different!

Example: Associated Gas Energy

- Oil drilling typically produces “associated gas” as well, which is costly to deal with and problematic for the environment

- Assume a new venture, namely, Associated Gas Energy, with a GTL (Gas To Liquid) technology to convert “associated gas” into crude oil at a cost of $70 to a *conservative* customer

- The customer can be convinced to buy using old-fashioned *direct sales methods*, especially at the beginning

Example: Associated Gas Energy

- Year 1 Plan:
  - Hire an experienced sales person (say, full package at $175K/year)
  - Hire a tech sales support person (say, full package at $125K/year)
  - Hire a consultant to help break through the initial customer inertia and to get all regulatory issues taken care of (say, full package at $150K/year)
  - Spend on travel (say, $24K), develop ad material (say, $15K), conduct a trade show (say, $30K), and develop a website (say, $10K)
  - Expected number of customers is 1

Example: Associated Gas Energy

- Years 2 & 3 Plans:
  - "Fire" the consultant since all regulatory issues will be resolved by then, let alone that the hardest sale (i.e., the first sale) will be done
  - Hire one extra salesperson and another tech support person every year to increases sales
  - Increase spending on travel, ad material, trade shows, and website maintenance
  - Expected numbers of customers are 3 & 7 in years 2 & 3, respectively

We will assume three time periods over only 3 years

Example: Associated Gas Energy

- COCA Calculation:

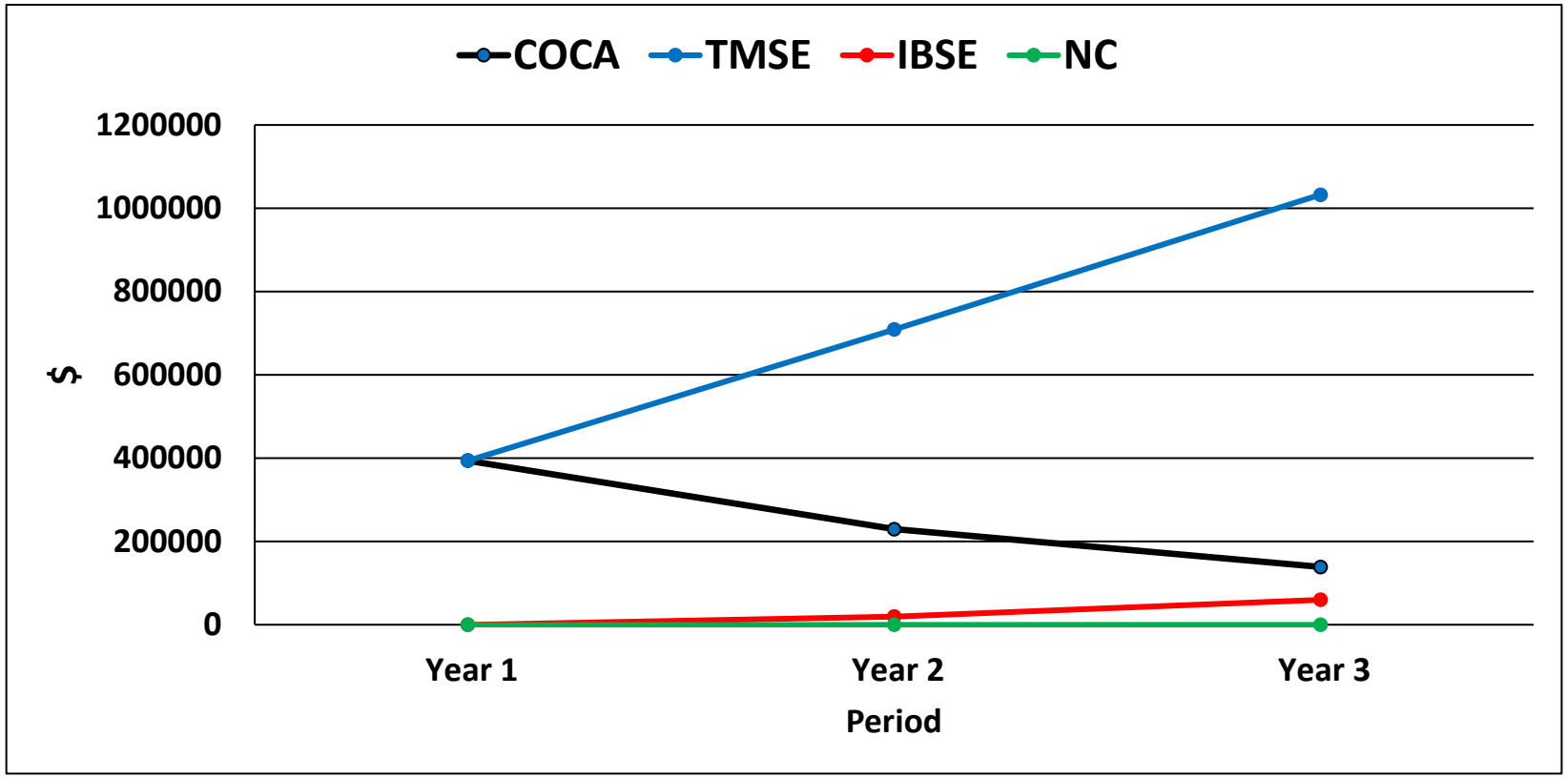
	Year 1	Year 2	Year 3
Salespeople Salaries	$175K × 1 = $175K	$175K × 2 = $350K	$175K × 3 = $525K
Tech Support People Salaries	$125 × 1 = $125K	$125 × 2 = $250K	$125 × 3 = $375K
Travel	$24,000	$40,000	$52,500
Ad Material	$15,000	$24,000	$30,000
Events	$30,000	$35,000	$40,000
Website Cost	$10,000	$10,000	$10,000
Consultant	$150,000	$0	$0
TMSE	**TMSE(1) = $394,000**	**TMSE(2) = $709,000**	**TMSE(3) $1,032,500**

Example: Associated Gas Energy

- COCA Calculation:

	Year 1	Year 2	Year 3
TMSE	TMSE(1) = $394,000	TMSE(2) = $709,000	TMSE(3) $1,032,500
NC	NC(1) = 1	NC(2) = 3	NC(3) = 7
IBSE	IBSE(1) = $0	IBSE(2) = $20,000	IBSE(3) = $60,000
COCA	COCA(1) = $394K	COCA(2) = ($709K-$20K)/3 = $229.666K	COCA(3) = ($1,032,500-$60K)/7 = $138.928K

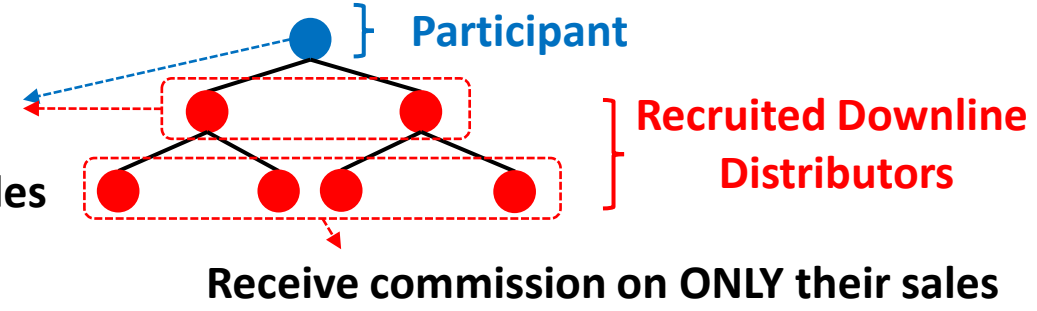
Example: Associated Gas Energy



How To Reduce COCA?

1. While very powerful, use direct sales judiciously as it is very expensive
   - Hiring a team to do direct sales may be necessary to start, but it is expensive
   - Consider investing in *technological enablers* (e.g., telemarketing, effective web presence, social media, etc.,)
   - Automate as much as possible via creating *incentive schemes* for your users to recruit others (e.g., Groupon & Uber)
   - Multi-Level Marketing (MLM), whereby a company makes revenue from *non-salaried workforce* (called *participants*), who sell its products and earn via a pyramid-shaped *commission system* is controversial (e.g., Avon)

Two revenue streams:
1) Commissions on their sales
2) Commission on their downline distributors' sales



How To Reduce COCA?

2. Improve *conversion rate* in sales
   - Not every desired deal is closed, although (huge) cost is usually associated with every chased deal
   - Increasing your rate of closing deals (e.g., improving your conversion rate) compensates for costs and opens up the funnel for more deals to get through
   - One way to achieve this is to decrease the cost and enhance the quality of *leads* (e.g., you can use HubSpot's *inbound marketing strategy*)

3. Choose your business model with COCA in mind
   - Your business model might make it easier to sell your product to customers (e.g., IntraLink); hence, decreasing the *sales cycle length*

How To Reduce COCA?

4. Drive positive word-of-mouth
   - This can improve you company's stature and let you easily cross the chasm towards the mainstream market
   - Focus on your beachhead market and employ the *viral engine of growth* (more on this next week)
   - One way to measure results is to use the *Net Promoter Score* or ***NPS***
     - How likely is it that you would recommend a product to a friend or colleague?
       - Respondents can be categorized into *three* groups:
         1) **Promoters** (score 9-10) are loyal enthusiasts who will keep buying and refer others, fueling growth

How To Reduce COCA?

4. Drive positive word-of-mouth
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   - Focus on your beachhead market and employ the *viral engine of growth* (more on this next week)
   - One way to measure results is to use the *Net Promoter Score* or ***NPS***
     - How likely is it that you would recommend a product to a friend or colleague?
       - Respondents can be categorized into *three* groups:
         2) **Passives** (score 7-8) are satisfied but unenthusiastic customers who are vulnerable to competitive offerings

How To Reduce COCA?

4. Drive positive word-of-mouth
   - This can improve you company's stature and let you easily cross the chasm towards the mainstream market
   - Focus on your beachhead market and employ the *viral engine of growth* (more on this next week)
   - One way to measure results is to use the *Net Promoter Score* or ***NPS***
     - How likely is it that you would recommend a product to a friend or colleague?
       - Respondents can be categorized into *three* groups:
         3) **Detractors** (score 0-6) are unhappy customers who can damage your brand and impede growth through negative word-of-mouth
     - **NPS** = % of Promoters - % of Detractors

Summary

- LTV and COCA allow you to determine whether the financials of your business will work
- They highlight the importance of keeping an eye on key factors to make your business profitable
- They provide simple scoreboard than the three core financial statements (*which we will cover later in the semester*)
- **Recommendation**: Do not let your optimism blind your from doing the right calculations of and using LTV and COCA

Next Class

- Product development: the lean approach