

Financial Analysis & Valuations

LES Add-On Session

Chris Haase, Ph.D.
BTG Ventures

Lionel Leventhal
Paul Capital Partners



Questions Addressed

From the perspective of the licensing executive:

- How choose between 2 (or more) projects?
- How much is this product worth (i.e. how much am I willing to pay)?
- What are the cash flow implications of in-licensing this product?
- How do I assess the possibility that there may be multiple outcomes?

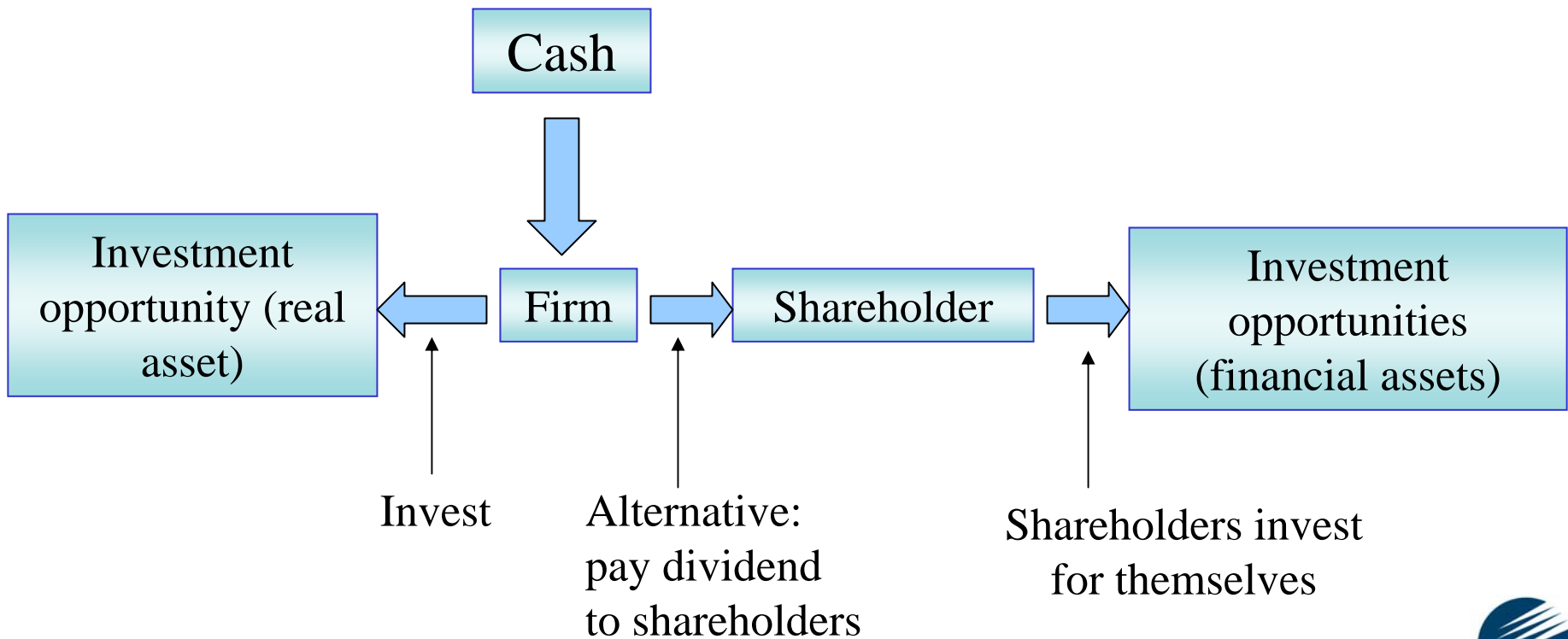


Tools Discussed

- Building a discounted cash flow (DCF) analysis
- Discount rates (how incorporate assessment of risk into project valuation)
- Expected value and Monte Carlo simulation (assessing multiple potential outcomes)
- Valuation using multiples



The Role of the Firm and Projects





Net Present Value

- “A Dollar Today is Worth More Than A Dollar Next Year”

$$PV = DF \times CF_t = \frac{CF_t}{1 + r_t}$$

- “A Dollar Today is Worth Even More Than A Dollar In Two Years”

$$PV = DF^2 \times CF_t = \frac{CF_t}{(1 + r_t)^2}$$



A Four-Period Case

Step 1:

Year	2004	2005	2006	2007
CF	-100	-50	30	200

Step 2: Determine the PVs of cash flows (10% discount rate):

DF	1.000	0.909	0.826	0.751	Total
DCF	-100.0	-45.5	24.8	150.3	= 29.6

Step 3: Sum

$$-100.00 - 45.5 + 24.8 + 150.3 = 29.6$$



Net Present Value

- 1) Identify ***all incremental cash flows*** (*Be comprehensive!*)

- 2) Where uncertain use ***expected values***
 - Don't bias your expectations to be “conservative”

- 3) Discount cash flow and sum to find ***net present value (NPV)***

- 4) If $NPV > 0$, go ahead

- 5) Sensitivity Analysis



IRR Example

- Consider a drug company that has the opportunity to invest \$100 million in the development of a new drug that will generate after-tax cash flows of \$20 million per year for the next 15 years. What is the IRR of this investment?
- The IRR makes $NPV = 0$.

$$NPV = \frac{1 - (1 + IRR)^{-15}}{IRR} 20 - 100 = 0$$

- This gives $IRR = 18.4\%$.
- Accept the project if $r_p < 18.4\%$.



Drawback of IRR

Mutually Exclusive Projects

- IRR sometimes ignores the magnitude of the project.
- The following two projects illustrate this problem.

Project	C_0	C_t	<i>IRR</i>	<i>NPV @ 10%</i>
<i>A</i>	-10,000	+20,000	100	+8,182
<i>B</i>	-20,000	+35,000	75	+11,818



Discounted Cash Flow (DCF) Analysis

- Inputs Required
 - Revenues
 - Variable costs
 - Fixed costs
 - Development (R&D) costs
 - Capital expenditures and working capital



Projecting Revenues

(see previous LEK presentation on market opportunity due diligence)

- Total population
- Relevant population (diagnosed and treated for specific disease)
- Share of relevant population treated by a class of competing products
- Share of class using a specific product
- Unit consumption per person
- Product unit price

Revenues = Relevant population x category share x product share x unit consumption x unit price





Costs

- Variable costs
 - Raw material
 - Production labor
- Fixed costs
 - Manufacturing capacity
 - Selling, general and administrative (SG&A)
- Development (R&D) costs
 - Pre-revenue to develop product
 - Post-launch to improve product



Income Projections: An Example

	<u>-1</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>
Revenues	\$0	\$0	\$5	\$10	\$25	\$27	\$27	\$25
Variable costs			-1.5	-2.5	-5.0	-5.4	-5.4	-5.5
Gross Profit			3.5	7.5	20	21.6	21.6	19.5
Gross Margin			70%	75%	80%	80%	80%	78%
Fixed Costs			-5.0	-5.0	-10.0	-10.0	-10.0	-10.0
Develop/R&D costs	-10.0	-5.0	0	-2.0	-2.0	0	0	0
Income (EBIT)	-10.0	-5.0	-1.5	0.5	8.0	11.6	11.6	9.5



Income to Cash Flow

	<u>Comment</u>
Income	EBIT
- Capital Expenditures	Plant and equipment
+ Depreciation of prior capital ex	Capex divided by useful life
- Increase in working capital	A/R, inventory, A/P (function of growth)
(working capital = difference in short term assets and liabilities)	



Cash Flow to Value

- **Discount rate a function of risk of the project**
 - Development risk
 - Product differentiation
 - Competition
 - Execution risk
- **Typical discount ranges**
 - 0% Risk free
 - 10-15% Dominant product in stable industry
 - 20-25% Uncertain competitive environment
 - 30-40%+ Risky product development
- **Weighted Average Cost of Capital**
 - Fairly academic and theoretical concept
 - Public company focused
 - Less useful for projects and products



Comparison of Projects (undiscounted)

<u>Flow</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>YEAR</u>		<u>Total Cash</u>
					<u>4</u>	<u>5</u>	
Product A 2 nd product to enter	-2	1	2	3	3	3	\$10
Product B Dominant product in stable industry	-5	5	5	5	5	4	\$19
Product C Risky product development	-10	-5	0	5	15	25	\$30

WHICH PRODUCT IS MOST ATTRACTIVE?

(can't answer without an assessment of risk through discount rates)



Discount Rate as a Valuation Tool

	<u>Total Cash Flow</u>	<u>Discount Rate</u>	<u>NPV</u>
Product A 2 nd product to enter	\$10	20%	\$3.8
Product B Dominant product in stable industry	\$19	10%	\$12.1
Product C Risky product development	\$30	35%	-\$1.2



Expected Value / Scenarios

YEAR

0 1 2 3 4 5

Development Cost -5

Probability

Scenario A	10%	0	0	0	0	0
Scenario B	70%	0	5	7.5	10	10
Scenario C	<u>20%</u>	0	5	10	20	30
	100%					

Expected Value = (10% x A) + (70% x B) + (20% x C)

= 0 4.5 7.25 11 13





Purchase Price Multiples

Examples of standards / rules of thumb:

- 3-4x current revenues is cost to in-license revenue-producing pharmaceutical
- 5x current cash flow is cost to purchase stable manufacturing company in leveraged buyout
- 5x year 5 revenues is cost to purchase a high risk development stage product
- Each of these purchase price multiples is effectively treated like the negative development cost prior to positive revenues or cash flows when determining net present value as in earlier example



Drawbacks of NPV & DCF

- Limitations of using the discounted cash flow model
 - Assumes an all-or-nothing approach to financing
 - Requires certainty of cash flows & discount rate
 - No management flexibility
- NPV analysis incorporates risk (in the discount rate)
 - Misses the flexibility available to decision makers
 - Risk-adjusted discount rate has to be determined



Options and Flexibility are GOOD

- Option to wait and see
- Option to stage investment
- Option to delay (to defer investment)
- Option to expand
- Option to contract
- Option to choose
- Option to switch resources / uses
- Option to discontinue construction or abandon
- Option to shut down, reopen



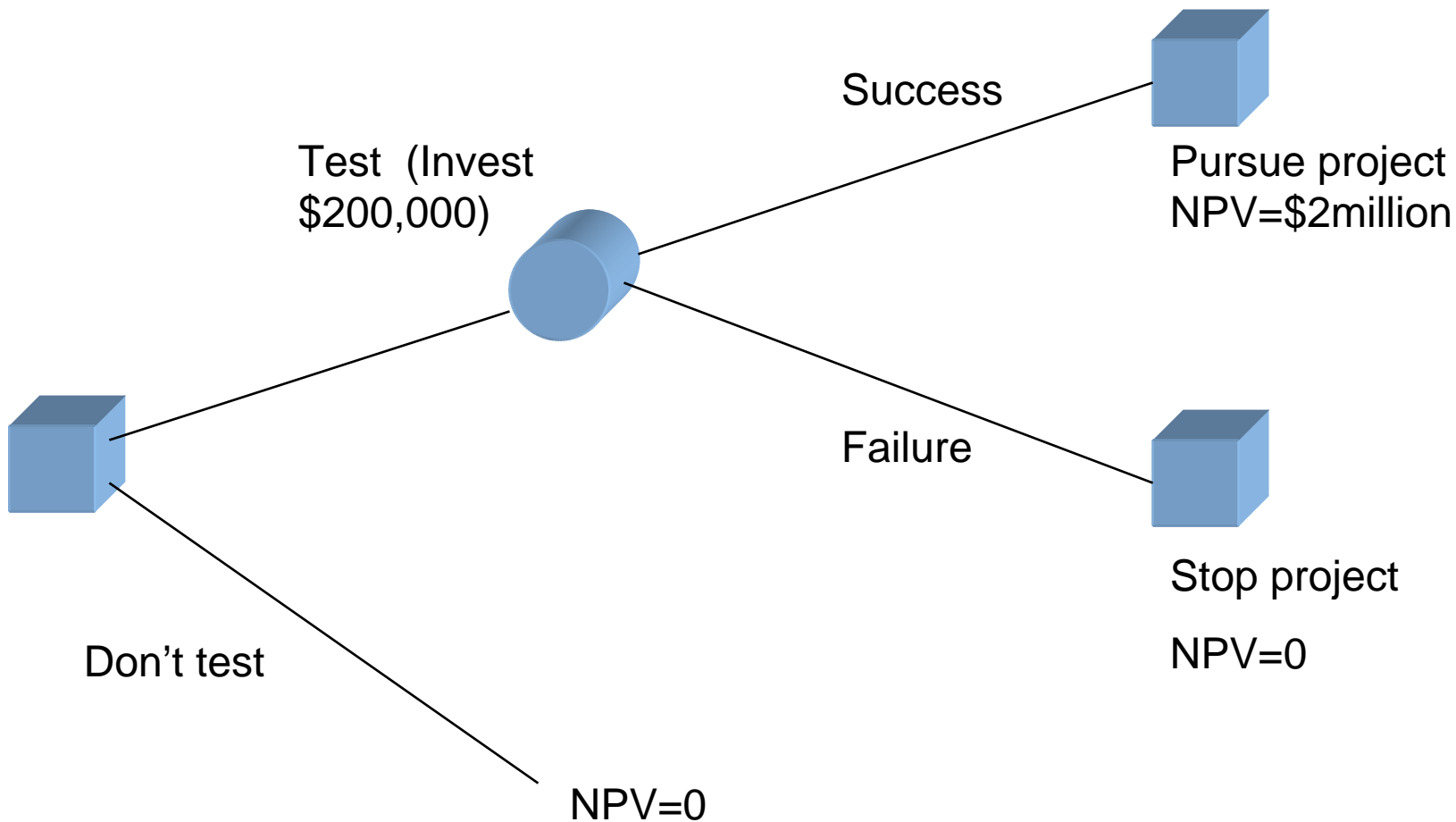
Options & Flexibility

Decision Trees - Diagram of sequential decisions and possible outcomes

- Decision trees help companies determine their Options by showing the various choices and outcome



Decision Trees





Monte Carlo Simulation

Rather than assigning probability weights to sales or income scenarios, instead identify the primary components driving sales and assess scenarios and probabilities for each component

Market Share	Probability
(a) High share	30%
(b) Medium share	60%
(c) Total bust	10%
Product Price	Probability
(i) Premium price	5%
(ii) Price parity	80%
(iii) Price discount	15%



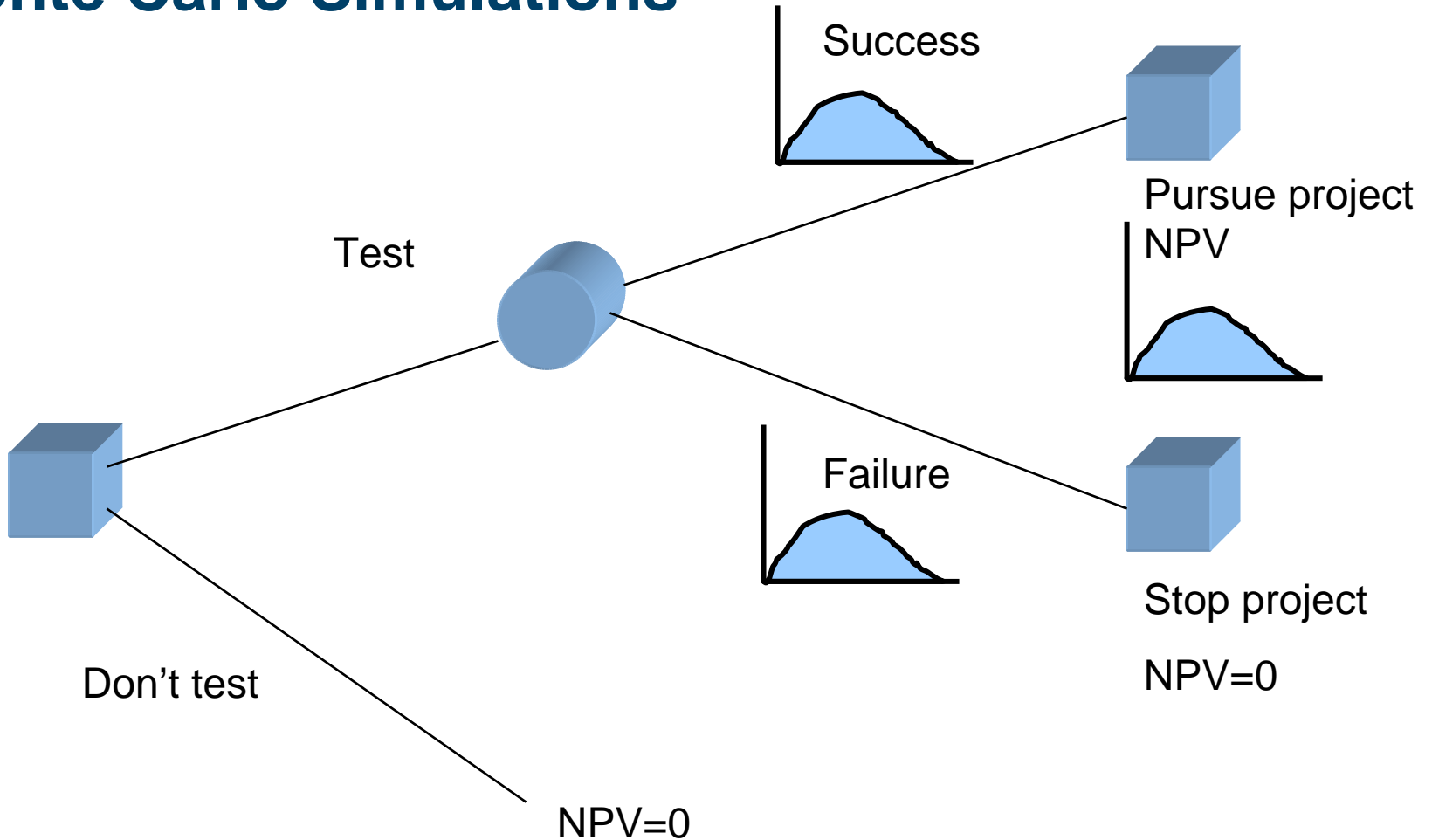
Monte Carlo Simulations (cont.)

Regulatory Compliance Costs (e.g. reduce VOC emissions)	Probability
(A) low	10%
(B) medium	80%
(C) crippling	10%

Monte Carlo simulation multiplies all 27 permutations of the three variables across a range of probabilities yields an expected value with more robust logic



Monte Carlo Simulations





Some Useful Resources

- Monte Carlo Simulations
 - Decisioneering's Crystal Ball Software
 - http://www.decisioneering.com/crystal_ball/
- Bayesian Decision Trees
 - Decision Support Services's TreePlan
 - <http://www.treeplan.com/>
- Remember: Easy to Use, Easy to Abuse !



Contact

BTG International Inc.

Chris Haase, Ph.D.

Principal, BTG Ventures

Chris.Haase@btgplc.com

West Conshohocken, PA

Tel. 610-943-3592



BTG