Calculating the Incremental Cash Flows

- Initial cash outflow -- the initial net cash investment.
- Interim incremental net cash flows -- those net cash flows occurring after the initial cash investment but not including the final period's cash flow.
- Terminal-year incremental net cash flows -- the final period's net cash flow.

Initial Cash Outflow

a)		*Cost of "new" assets*
b)	+	Capitalized expenditures
c)	+ (-)	Increased (decreased) NWC
d)	-	Net proceeds from sale of "old" asset(s) if replacement
e)	+ (-)	Taxes (savings) due to the sale of "old" asset(s) if replacement
f)	=	Initial cash *outflow*

Incremental Cash Flows

a) Net incr. (decr.) in operating revenue less (plus) any net incr. (decr.) in operating expenses, excluding depr.
b) - (+) Net incr. (decr.) in tax depreciation
c) = Net change in income before taxes
d) - (+) Net incr. (decr.) in taxes
e) = Net change in income after taxes
f) + (-) Net incr. (decr.) in tax depr. charges
g) = Incremental net cash flow for period

Terminal-Year Incremental Cash Flows

a)		Calculate the incremental net cash flow for the terminal period
b)	+ (-)	Salvage value (disposal/reclamation costs) of any sold or disposed assets
c)	- (+)	Taxes (tax savings) due to asset sale or disposal of "new" assets
d)	+ (-)	Decreased (increased) level of "net" working capital
e)	=	Terminal year incremental net cash flow

Operating cash flows simplified

- We can say that

$$\Delta OCF = (\Delta R - \Delta E - \Delta D)(1-t) + \Delta D - \Delta NWC$$

Risk and Managerial Options in Capital Budgeting

Risk and Managerial Options in Capital Budgeting

- The Problem of Project Risk
- Total Project Risk
- Contribution to Total Firm Risk: Firm-Portfolio Approach
- Managerial Options

An Illustration of Total Risk (Discrete Distribution)

ANNUAL CASH FLOWS: YEAR 1

PROPOSAL A

State	Probability	Cash Flow
Deep Recession	.05	$ -3,000
Mild Recession	.25	1,000
Normal	.40	5,000
Minor Boom	.25	9,000
Major Boom	.05	13,000

Summary of Proposal A

The standard deviation = SQRT (14,400,000) = $3,795

The expected cash flow = $5,000

An Illustration of Total Risk (Discrete Distribution)

ANNUAL CASH FLOWS: YEAR 1

PROPOSAL B

State	Probability	Cash Flow
Deep Recession	.05	$ -1,000
Mild Recession	.25	2,000
Normal	.40	5,000
Minor Boom	.25	8,000
Major Boom	.05	11,000

Summary of Proposal B

The standard deviation =

SQRT (8,100,000) = $2,846

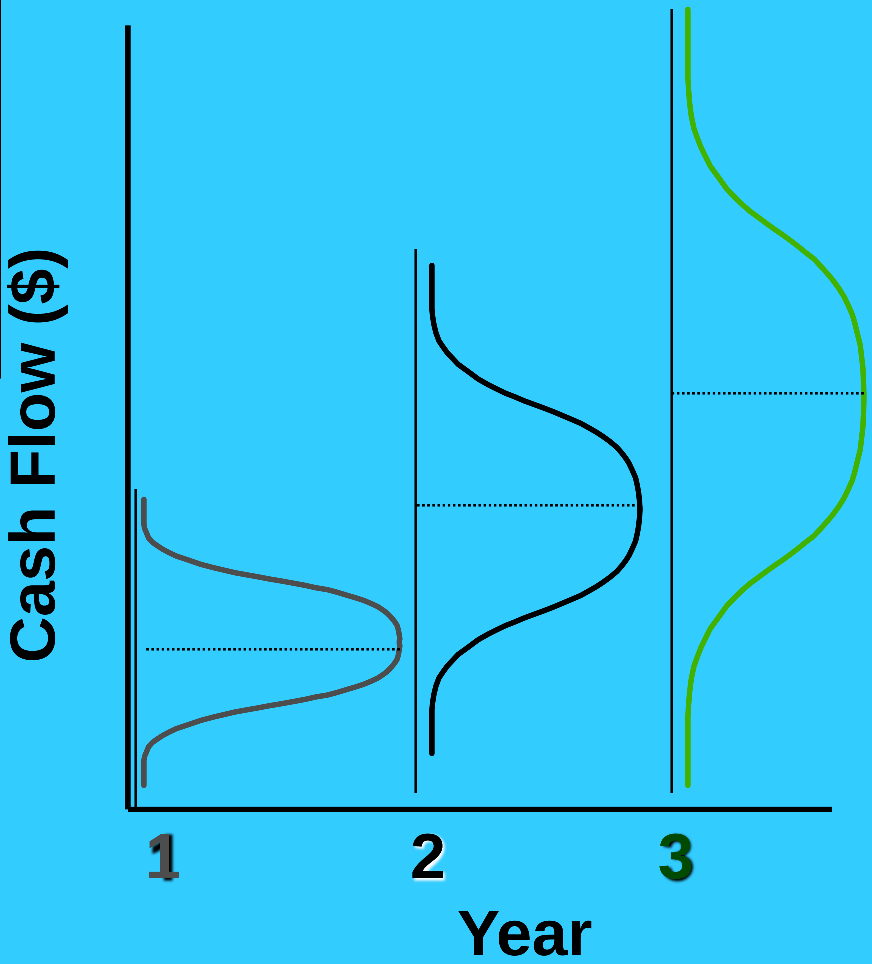
The expected cash flow = $5,000

The standard deviation of
Proposal B < Proposal A.
($2,846 < $3,795)

Total Project Risk

Projects have risk that may *change* from period to period.

Projects are more likely to have *continuous*, rather than discrete distributions.



Probability Tree Approach

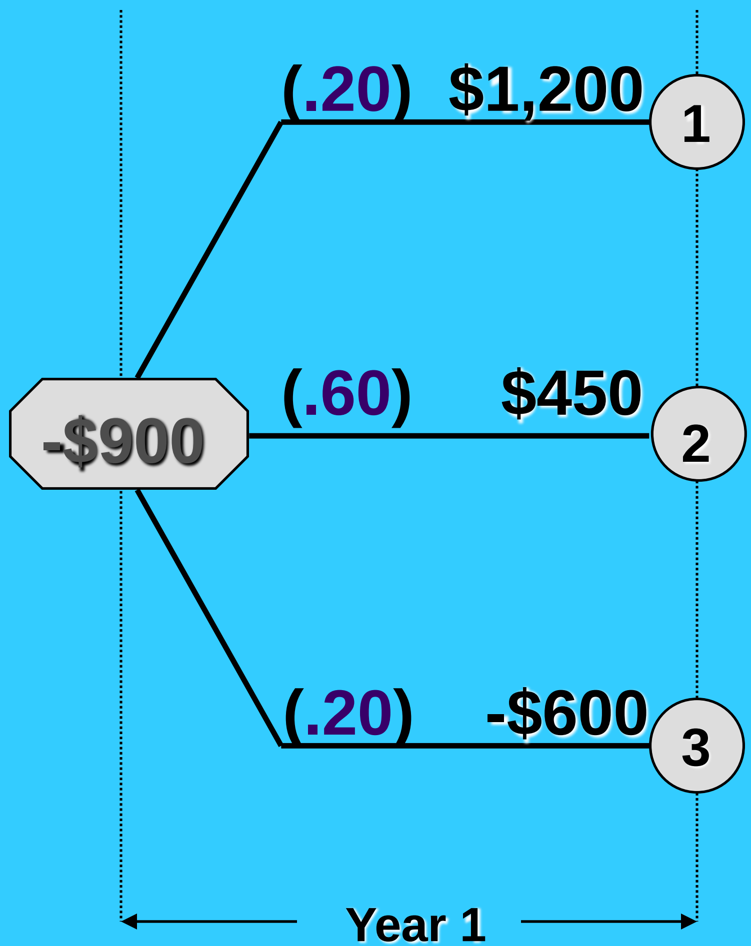
A graphic or tabular approach for organizing the possible cash-flow streams generated by an investment. The presentation resembles the branches of a tree. Each complete branch represents one possible cash-flow sequence.

Probability Tree Approach

-$900

Basket Wonders is examining a project that will have an initial cost today of $900. Uncertainty surrounding the first year cash flows creates three possible cash-flow scenarios in Year 1.

Probability Tree Approach

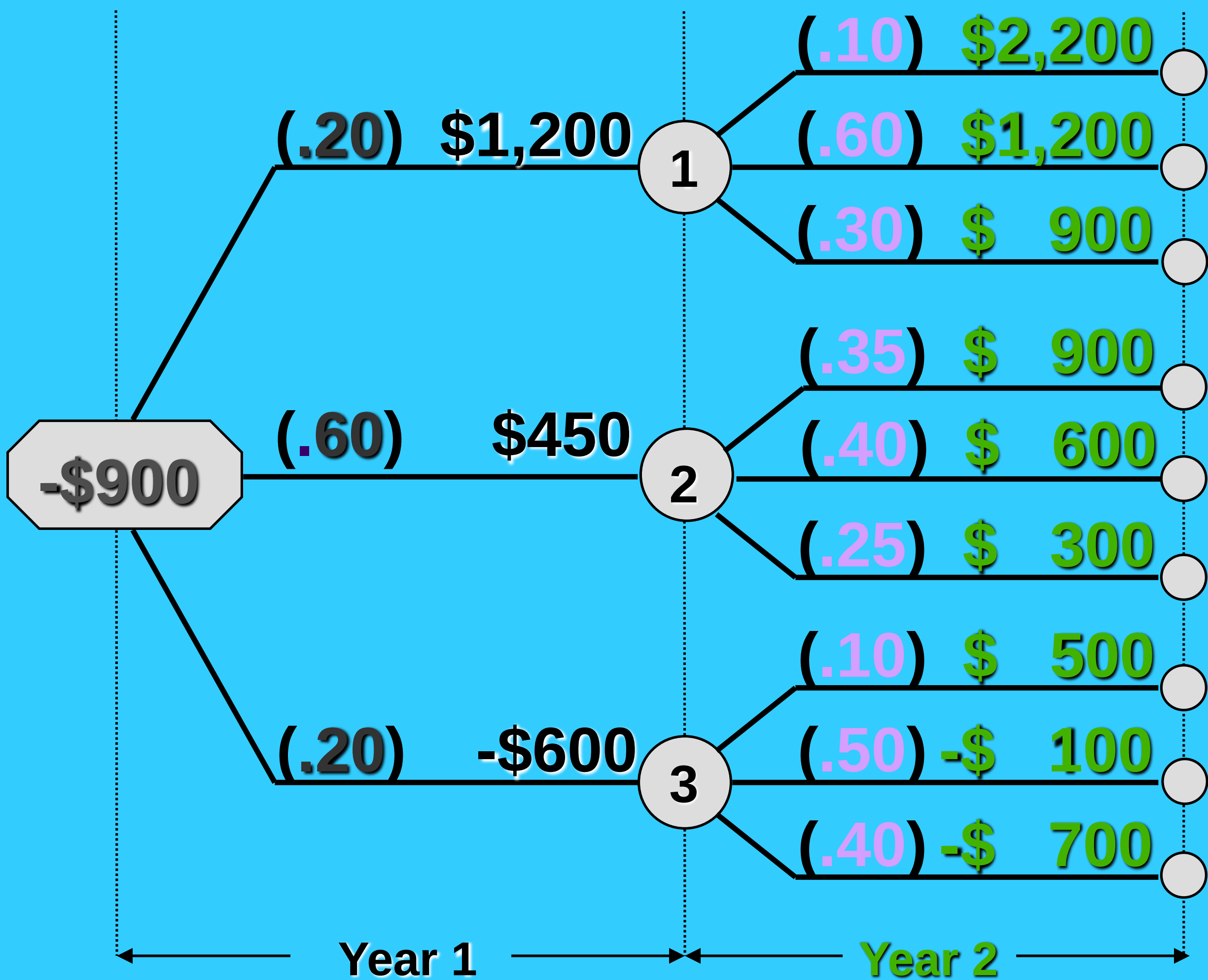


Node 1: 20% chance of a $1,200 cash-flow.

Node 2: 60% chance of a $450 cash-flow.

Node 3: 20% chance of a - $600 cash-flow.

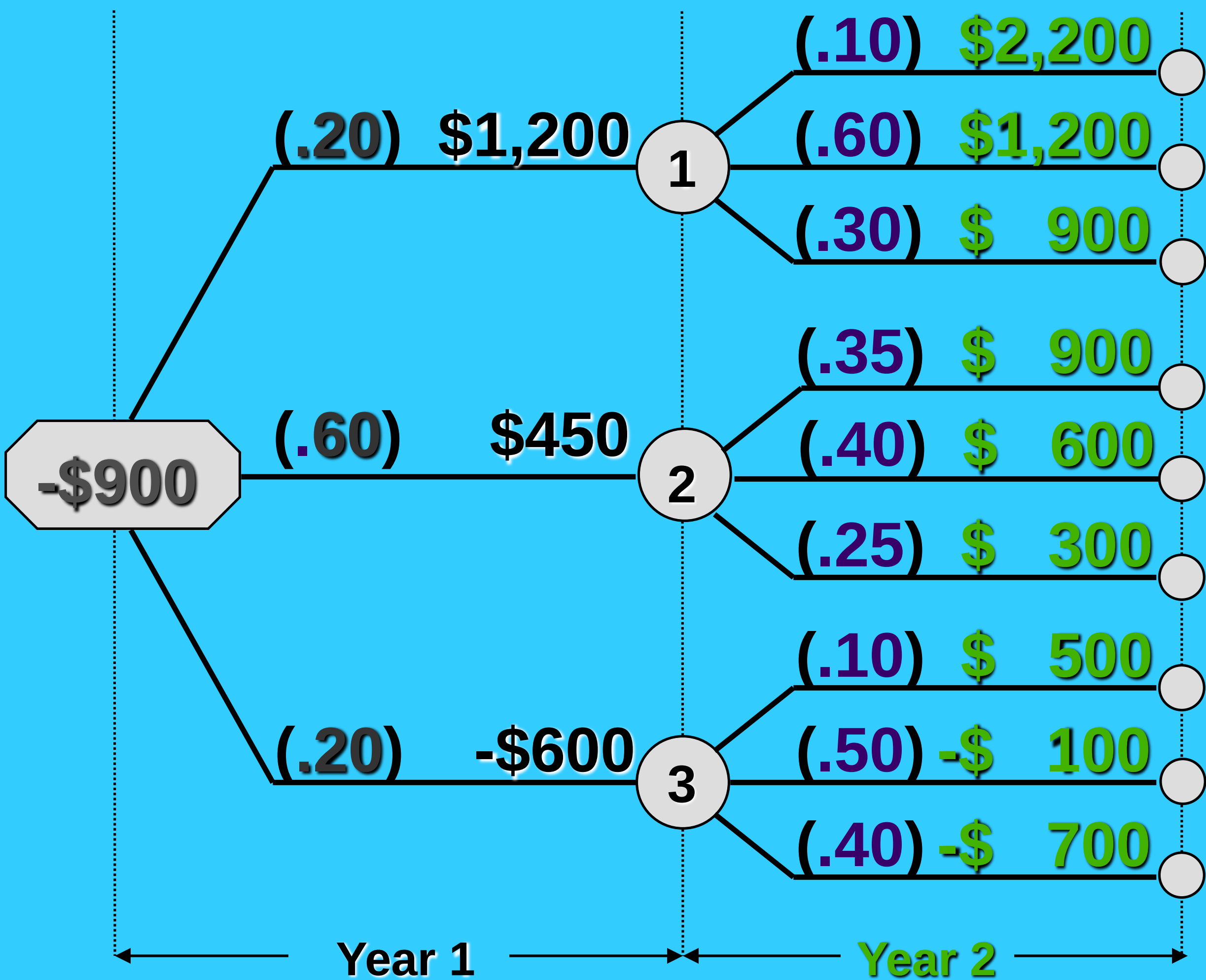
Probability Tree Approach



Each node in Year 2 represents a *branch* of our probability tree.

The probabilities are said to be conditional probabilities.

Joint Probabilities [P(1,2)]



.02	Branch 1
.12	Branch 2
.06	Branch 3
.21	Branch 4
.24	Branch 5
.15	Branch 6
.02	Branch 7
.10	Branch 8
.08	Branch 9

Project NPV Based on Probability Tree Usage

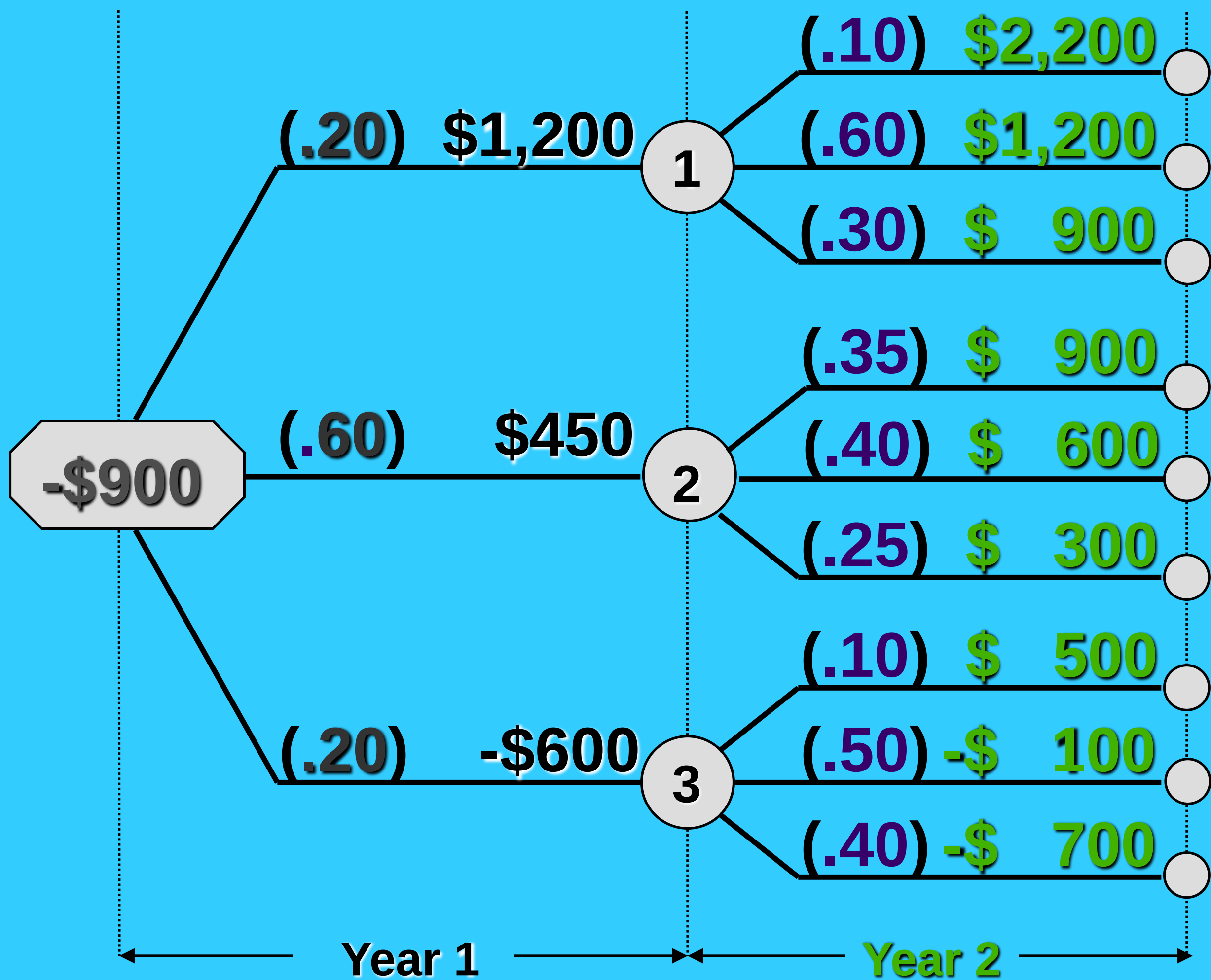
$$\overline{NPV} = \sum_{i=1}^{z} (NPV_i)(P_i)$$

The probability tree accounts for the distribution of cash flows. Therefore, discount all cash flows at *only* the risk-free rate of return.

The NPV for branch i of the probability tree for two years of cash flows is

$$NPV_i = \frac{CF_1}{(1 + R_f)^1} + \frac{CF_2}{(1 + R_f)^2} - ICO$$

NPV for Each Cash-Flow Stream at 5% Risk-Free Rate



$ 2,238.32
$ 1,331.29
$ 1,059.18

$ 344.90
$ 72.79
-$ 199.32

-$ 1,017.91
-$ 1,562.13
-$ 2,106.35

Calculating the Expected Net Present Value (NPV)

Branch	NPV_i	P(1,2)	NPV_i * P(1,2)
Branch 1	$ 2,238.32	.02	$ 44.77
Branch 2	$ 1,331.29	.12	$159.75
Branch 3	$ 1,059.18	.06	$ 63.55
Branch 4	$ 344.90	.21	$ 72.43
Branch 5	$ 72.79	.24	$ 17.47
Branch 6	-$ 199.32	.15	-$ 29.90
Branch 7	-$ 1,017.91	.02	-$ 20.36
Branch 8	-$ 1,562.13	.10	-$156.21
Branch 9	-$ 2,106.35	.08	-$168.51

Expected Net Present Value = -$ 17.01

Summary of the Decision Tree Analysis

The standard deviation = SQRT ($1,031,800) = $1,015.78

The expected NPV = -$ 17.01

Simulation Approach

An approach that allows us to test the possible results of an investment proposal before it is accepted. Testing is based on a model coupled with probabilistic information.

Simulation Approach

Each proposal will generate an internal rate of return. The process of generating many, many simulations results in a large set of internal rates of return. The distribution might look like the following: