

Net Present Value (NPV)

(A very short course)

- What is it?
- Why do we need it?
- Some examples
- What it doesn't do...

(NPV) What is it?

- NPV is Present Value of all future proceeds less any upfront and maintenance costs.
- The basic computation for PV is :

$$PV = F(1+i)^{-n} \text{ or } F/(1+i)^n,$$

where F = Future Value

i = interest rate per time period

n = # of time periods

How does it work?

What's a million \$\$\$ worth?

Say you are going to retire in 2030 with \$1 million. Wow!! Now what's that worth today?

Givens/Assumptions:

$$F = \$ 1,000,000$$

$$i = 3\% / \text{year}$$

$$n = 23 \text{ (years)}$$

$$P = F(1+i)^{-n} =$$

$$\frac{\$ 1,000,000}{(1+.03)^{23}}$$

$$= \$ 1,000,000/1.9735865111266$$

$$=$$

$$= \mathbf{\$ 506,692}$$

How does it work (Inflation)?

What if there was 5% inflation??

Givens/Assumptions:

$$F = \$ 1,000,000$$

$$i = 5\% / \text{year}$$

$$n = 23 \text{ (years)}$$

$$P = F(1+i)^{-n} =$$

$$\frac{\$ 1,000,000}{(1+.05)^{23}}$$

$$= \$ 1,000,000/3.071524$$

$$= \$ 325,571$$

PV of Annuities

- Annuities are constant monthly cash flow.
- The basic computation is :

$$PV = A \left[\frac{(1 + i)^n - 1}{i(1 + i)^n} \right]$$

where A = Monthly annuity/income

i = interest rate per time period

n = # of time periods

Hey, I just won \$35,000,000. What should I do????

Here's the deal: The game board says that you can either get a lump sum of \$10,000,000... or monthly payments of 20,000 for 20 years.

Which do you want?

So, how much is \$20k/month for 20 years worth today? Is it more than \$10mil??

\$10 million in 20 years??

Givens/Assumptions:

$$A = 20,000$$

$$i = 3\%$$

$$n = 240$$

$$PV = ???$$

$$20K \times \frac{(1 + .03)^{240}}$$

Oops...

$$20K \times \frac{(1 + .0025)^{240} - 1}{.0025(1.0025)^{240}}$$

$$= \frac{20,000 \times .82075}{.0045}$$

$$=$$

\$ 3.6 million!!! That's it.

So, take the \$\$ and run.

Why do we need it?

- Basically, computing NPV establishes the value that a specific project brings to the company.
- It shows management how much can be gained in terms they understand
- It shows how Quality can add value

Some examples...

- Project 1

You've done statistical analysis and found that savings can be achieved by automating the report generating process. The following are the numbers:

Programming needed: 40 hrs x \$69 = \$2,760

Hardware needed: None

New software needed: None

Hours saved: 24 hrs/month @ \$40/hr (1st yr)

Project 1 (cont'd)

NPV of Savings											
Project	Year	Hrs/Mo saved	\$ rate	\$/month	\$/year labor saved	Cost of Improvement (Labor)	Cost of Improvement (Hard Asset)	Depreciation (Assume 3 yr life)	Total costs (current year)	Costs savings less cost	Present value of net cost savings
1	1	24	40	\$ 960	\$ 11,520	\$ 2,760			\$ 2,760	\$ 8,760	\$ 8,760
	2	24	43	\$ 1,032	\$ 12,384					\$ 12,384	\$ 12,018
	3	24	46	\$ 1,104	\$ 13,248					\$ 13,248	\$ 12,857
	4	24	49	\$ 1,176	\$ 14,112					\$ 14,112	\$ 13,695
	5	24	52	\$ 1,248	\$ 14,976					\$ 14,976	\$ 14,534

Total savings after 5 years:	\$ 61,865
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Another example...

- Project 2

Due to a burgeoning workload (yeah, right!) your DBA replaced 2 old servers. The following are the numbers:

Program/setup needed: $10 \text{ hrs} \times \$70/\text{hr} = \700

Hardware needed: $(2) \times \$12,000 = \$24,000$

New software needed: Included

Hours saved: $34 \text{ hrs/month} @ \$50/\text{hr} (1^{\text{st}} \text{ yr})$

Project 2

NPV of Savings											
Project	Year	Hrs/Mo saved	\$ rate	\$/month	\$/year labor saved	Cost of Improvement (Labor)	Cost of Improvement (Hard Asset)	Depreciation (Assume 3 yr life)	Total costs (current year)	Costs savings less cost	Present value of net cost savings
2	1	34	50	\$ 1,700	\$ 20,400	\$ 2,760	\$ 24,000	\$ 8,000	\$ 10,760	\$ 9,640	\$ 9,640
	2	34	53	\$ 1,802	\$ 21,624			\$ 8,000	\$ 8,000	\$ 13,624	\$ 13,222
	3	34	56	\$ 1,904	\$ 22,848			\$ 8,000	\$ 8,000	\$ 14,848	\$ 14,410
	4	34	60	\$ 2,040	\$ 24,480				\$ -	\$ 24,480	\$ 23,757
	5	34	63	\$ 2,142	\$ 25,704				\$ -	\$ 25,704	\$ 24,945

Total savings after 5 years:		\$ 85,974
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Plus:	Tax savings = \$24,000 x 30% =	\$ 7,800
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What NPV doesn't do

- Compute qualitative or intangible effects
 - How much business does this better or higher quality report generate?
 - Was the customer retained due to higher quality? Or lost due to lower quality?
 - How do we know if the customer is satisfied or not?
 - Finally, what is Customer Value??