

# **Analysis of Risk**

## **Section 5**

### **Cash Discounting Concepts**

# Poll Question

If you know any 3 of the following you can easily calculate the 4<sup>th</sup>.

- Present Value
- Future Value
- Number of Periods
- Interest Rate

1. True
2. False

# Lottery Decision

\$550 Million over 30 Years or \$360 M Today?

# Lottery Decision

## Present Value of an Annuity (30 Periods)

Rate	Factor
1%	25.808
2%	22.396
3%	19.600
4%	17.292
5%	15.372

$\$550 \text{ Million} / 30 \text{ years} = \$18.333 \text{ M per year}$

# \$550 Million over 30 Years or \$360 M Today?

$$25.808 \times 18.333 = \$473 \text{ Million}$$

<u>Rate</u>	<u>Factor</u>	<u>Present Value</u>
1%	25.808	\$473,000,000
2%	22.396	\$411,000,000
3%	19.600	\$359,000,000
4%	17.292	\$317,000,000
5%	15.372	\$282,000,000



Losses = \$250K

GC Premium = \$600K

\$999,775 – \$438,203 = \$561,572

		End of Year				
Item	Beginning	1	2	3	4	5
Expenses	356,527					-
Frequency Fund	333,536					83,634
Severity Fund	142,944					142,944
Security	166,768					166,768
Interest	-					44,857
Claims	-					
Totals	(999,775)	0	0	0	0	438,203
PV of Benefits	\$360,171					
NPV	(\$639,604)					

# Poll Question

Which Evaluation Technique do you think is the most useful?

1. Payback
2. Accounting Rate of Return
3. Net Present Value
4. Benefit Cost Ratio
5. Internal Rate of Return

# Hybrid Decision

Greater Investment (\$5,000?)

vs.

Lower Operating Costs

Future Price of Gas

Miles Driven Per Year

Battery Replacement in Year 5?



# Poll Question

Now that you have seen each Evaluation Technique used, which do you think is the most useful?

1. Payback
2. Accounting Rate of Return
3. Net Present Value
4. Benefit Cost Ratio
5. Internal Rate of Return

# Poll Question

True or False?

It is nice to be able to justify the financial benefit of a project using NPV, BCR, and/or IRR, but sometimes you have to ignore the financial analysis and just do it.

- 1. True – The need for some projects transcends the financial returns.**
- 1. False – You can always incorporate social values into the financial analysis.**

# Ford Pinto



# Ford Pinto





## CONCLUSION

The NHTSA estimate of 2000 to 3500 fatalities yearly in fire-involved motor vehicle crashes appears to overstate the seriousness of the fire problem. Examination of in-depth accident data sources indicates that most fatalities in fire-accompanied crashes die from injuries not associated with the fire itself. Thus the National Safety Council estimate of 600 to 700 fire deaths each year is probably more appropriate than the higher NHTSA figure.

The actual number of fuel leakage incidents is relatively evenly distributed into four basic crash types: frontal, side, rear, and rollover. However, the likelihood of a given crash resulting in fuel spillage is much higher for rear impacts (26 percent with spillage in the sample studied) than for other crash types, such as frontals (3.5 percent spillage).

The cost of implementing the rollover portion of the amended Standard has been calculated to be almost three times the expected benefit, even using very favorable benefit assumptions. The yearly benefits of compliance were estimated at just under \$50 million, with an associated customer cost of \$137 million. Analyses of other portions of the proposed regulation could also be expected to yield poor benefit-to-cost ratios.



Table 3

BENEFITS AND COSTS RELATING TO FUEL LEAKAGE ASSOCIATED WITH THE  
STATIC ROLLOVER TEST PORTION OF FMVSS 208

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BENEFITS:

Savings - 180 burn deaths, 180 serious burn injuries, 2100 burned vehicles.

Unit Cost - \$200,000 per death, \$67,000 per injury, \$700 per vehicle.

Total  
Benefit -  $180 \times (\$200,000) + 180 \times (\$67,000) + 2100 \times (\$700) = \underline{\$49.5 \text{ million}}$ .

COSTS:

Sales - 11 million cars, 1.5 million light trucks.

Unit Cost - \$11 per car, \$11 per truck.

Total Cost -  $11,000,000 \times (\$11) + 1,500,000 \times (\$11) = \underline{\$137 \text{ million}}$ .

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## Benefit and Cost Comparison

The total benefit is shown in Table 3 to be just under \$50 million, while the associated cost is \$137 million. Thus the cost is almost three times the benefits, even using a number of highly favorable benefit assumptions. As better estimates of the parameters used in the benefit analysis become available, they could be inserted into the general analysis framework. It does not appear likely, however, that such alternate estimates could lead to the substantial benefit estimate increase which would be required to make compliance with the rollover requirement cost effective.

## Benefits and Costs For Other Impact Modes

The analysis discussed above concerns only rollover consequences and costs. Similar analysis for other impact modes would be expected to yield comparable results, with the implementation costs far outweighing the expected benefits.

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# End of Section 5

## Things to Know:

### 1. How to calculate:

- Future Value
- Present Value

### 2. 5 Project Evaluation Techniques

- Advantages and disadvantages

### 3. Problems with IRR