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Decision Rules

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Section A

Decision Rules for Cost-Benefit Analysis

Covered in this session

- ★ *Non-budget constrained CBA*
- ★ *Budget constrained CBA*
- ★ *Mutually exclusive versus compatible programs*

Covered in later sessions of this lecture

- ★ *CEA Part I*
- ★ *CEA Part II*

Calculate costs

Place a dollar value on all benefits

Take difference between dollar value of all benefits and dollar value of costs

- ★ *Net benefit*
- ★ *Regardless of distribution of benefits within the population*

Anything with a positive net benefit should be adopted if the goal is to maximize net benefits

Calculate net benefits similar

Divide net benefits by cost based on constrained resources

Calculate net benefit obtained per dollar of the constrained resource spent

Calculate net benefits similar

Divide net benefits by cost based on constrained resources

Calculate net benefit obtained per dollar of the constrained resource spent

Rank order from highest net benefit per dollar spent to lowest to choose

May not end up choosing single program with highest net benefit

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Certainty of Conclusions Regarding Net Benefit

If based on primary data, can calculate p-value for comparison with zero net benefit

If based on secondary data, can run a bootstrapping exercise and ask how many replications suggest a positive net benefit

Mutually Exclusive Versus Compatible Alternatives

With mutually exclusive alternatives, choose single best one to implement

However, have to consider different alternatives dealing with different conditions

- ★ *Compare relative spending on different diseases*
- ★ *Not often done in practice*



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Section B

Decision Rules for Cost-Effectiveness Part I

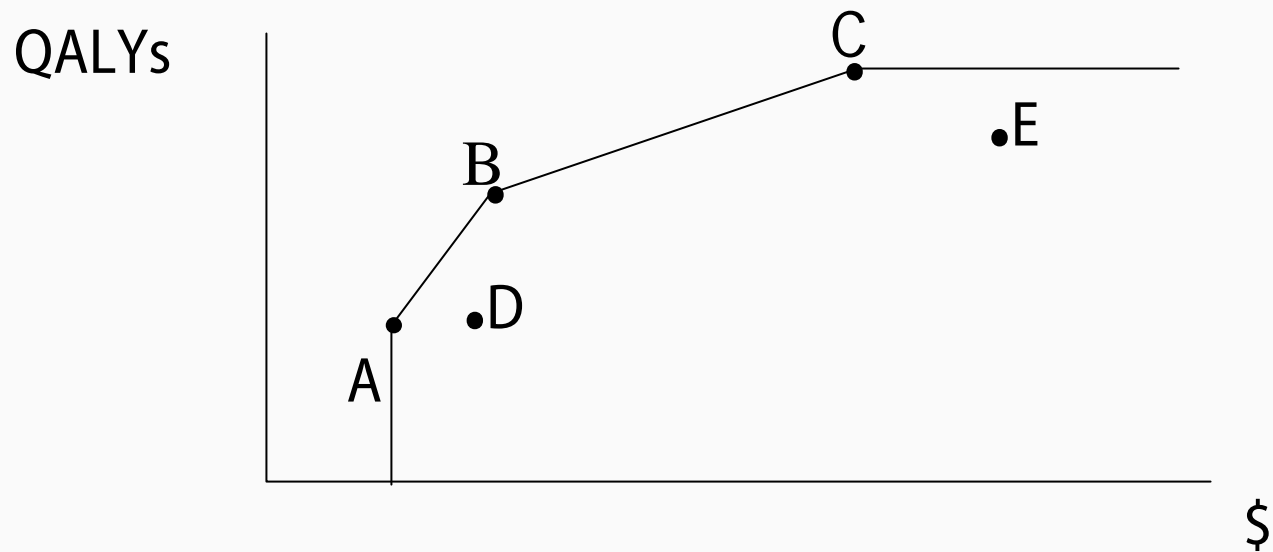
Dominance

- ★ *What alternatives should not be considered from an economic perspective*

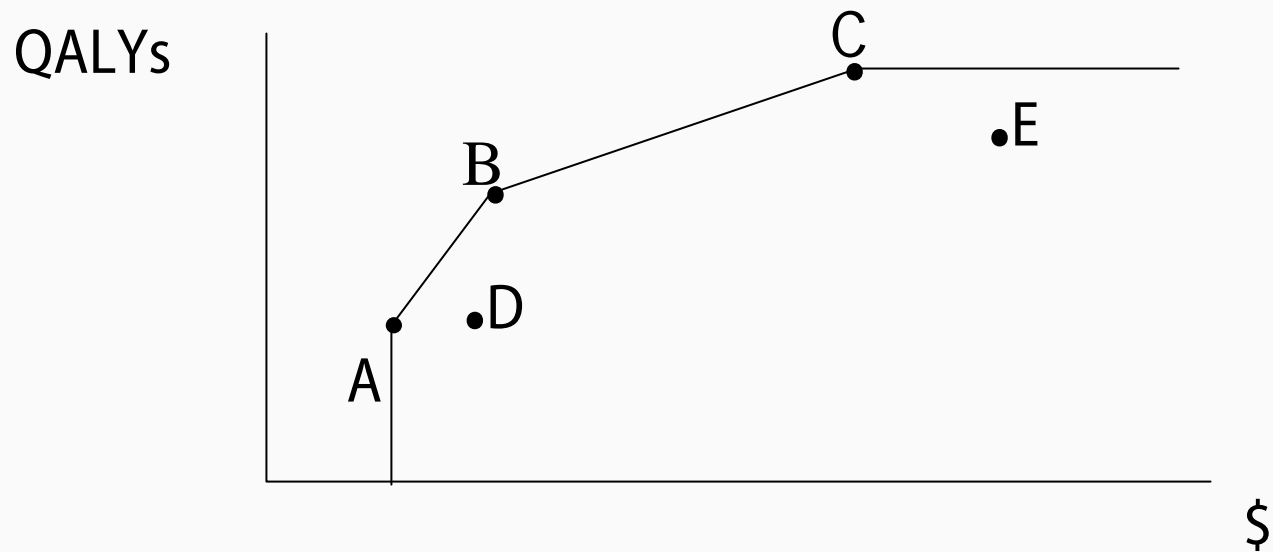
Graphing

Calculations

D and E are dominated



D and E are dominated



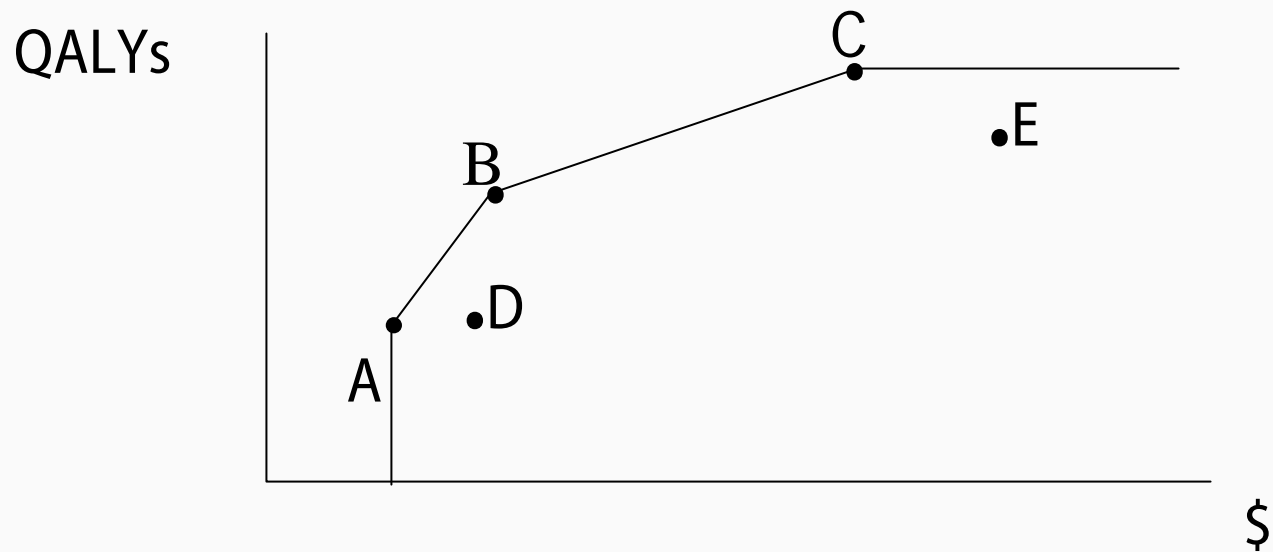
Strong dominance

- ★ *Another alternative is both more effective and less expensive*

Weak dominance

- ★ *Some combination of two alternatives is better than a third alternative*

D and E are dominated



Cost Plotted on X-Axis, Effect Plotted on Y-Axis

We could have a graph in a series of line segments connecting every two non-dominated alternatives

- ★ *Non-dominated alternatives get increasingly flatter as we move from less expensive to more expensive undominated alternatives*
- ★ *All dominated alternatives should be below and to the right of the series of line segments*

Cost Plotted on X-Axis, Effect Plotted on Y-Axis

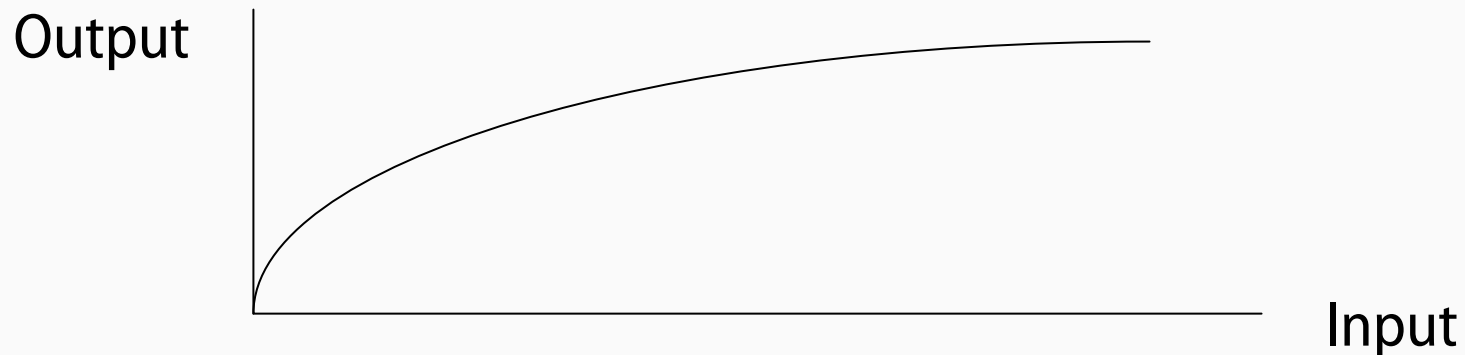
We could have a graph in a series of line segments connecting every two non-dominated alternatives

- ★ *There should be no way to draw a line connecting any two undominated alternatives that is above or to the left of the series of line segments connecting the undominated alternatives*

Eliminating Dominated Alternatives Graphically (2)

Graph should resemble a “production function”

- ★ *First unit of input produces more than next unit and this trend continues*
- ★ *Creates a graph looking like the one below*



Arrange alternatives from least expensive to most expensive in a table like the one on the following slide

If any of the alternatives is out of increasing order for total effect it is strongly dominated and should be removed

★ *Eliminate alternative B*

Example Table (1)

Alternative	Total Cost	Total Effect	Inc. Cost	Inc. Effect	ICER
A	\$100,000	3			
B	\$200,000	2			
C	\$400,000	4			
D	\$450,000	4.5			
E	\$700,000	8			

Calculate incremental costs for all alternatives other than the least expensive

★ *We are not assuming that doing nothing with no cost and no effect is an option*

Calculate incremental effects for all alternatives other than the least expensive

Calculate all incremental cost-effectiveness ratios (see next slide)

Example Table (2)

Alternative	Total Cost	Total Effect	Inc. Cost	Inc. Effect	ICER
A	\$100,000	3			
C	\$400,000	4	\$300,000	1	\$300,000
D	\$450,000	4.5	\$50,000	0.5	\$100,000
E	\$700,000	8	\$250,000	3.5	\$71,428

Starting from the least expensive, eliminate any alternative that is in the middle of three, such that the ICER comparing the first and second is larger than the ICER comparing the second and third

- ★ *Alternative C in the preceding slide*

Repeat ICER calculation (see next slide)

- ★ *Repeat elimination process again*

- ★ *Eliminate alternative D*

Example Table (3)

Alternative	Total Cost	Total Effect	Inc. Cost	Inc. Effect	ICER
A	\$100,000	3			
D	\$450,000	4.5	\$350,000	1.5	\$233,333
E	\$700,000	8	\$250,000	3.5	\$71,428

Continue process until moving down the chart we move from least to most expensive, least to most effective, and lowest to highest ICER

- ★ *There may be (as in the case on the next slide) only two alternatives remaining*

Example Table (4)

Alternative	Total Cost	Total Effect	Inc. Cost	Inc. Effect	ICER
A	\$100,000	3			
E	\$700,000	8	\$600,000	5	\$120,000



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Section C

Decision Rules for Cost-Effectiveness Part II

How the ICER should be used

How the ICER should be discussed both for policy and practice

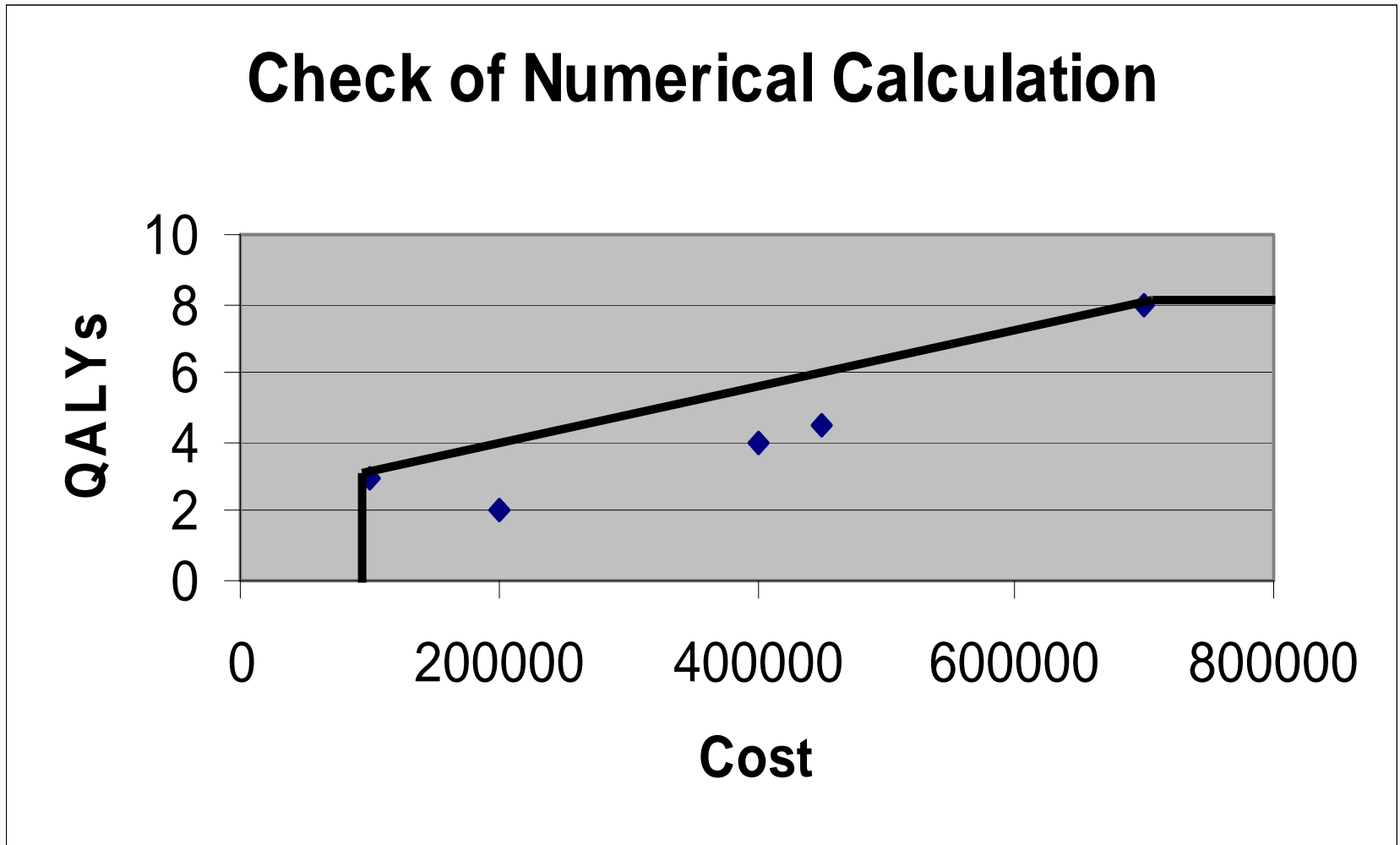
Decision maker is left to decide if spending the amount implied by the ICER to reach the next most expensive alternative is worthwhile

Analyst does not put a value on an ICER

- ★ *Decision maker uses his or her own judgment to decide how much is worthwhile to spend*
- ★ *If there are only two undominated alternatives then you only need to decide if it is worth spending a certain amount more*

If there are multiple undominated programs . . .

- ★ *First ask if it is worthwhile to spend the additional amount on the next to the least expensive undominated alternative*
- ★ *If it is worthwhile, then ask about moving up to the next alternative*
- ★ *Proceed until spending is no longer considered to be worthwhile*



Simplest When Comparing Two Alternatives

Run a “bootstrapping” exercise to determine the following:

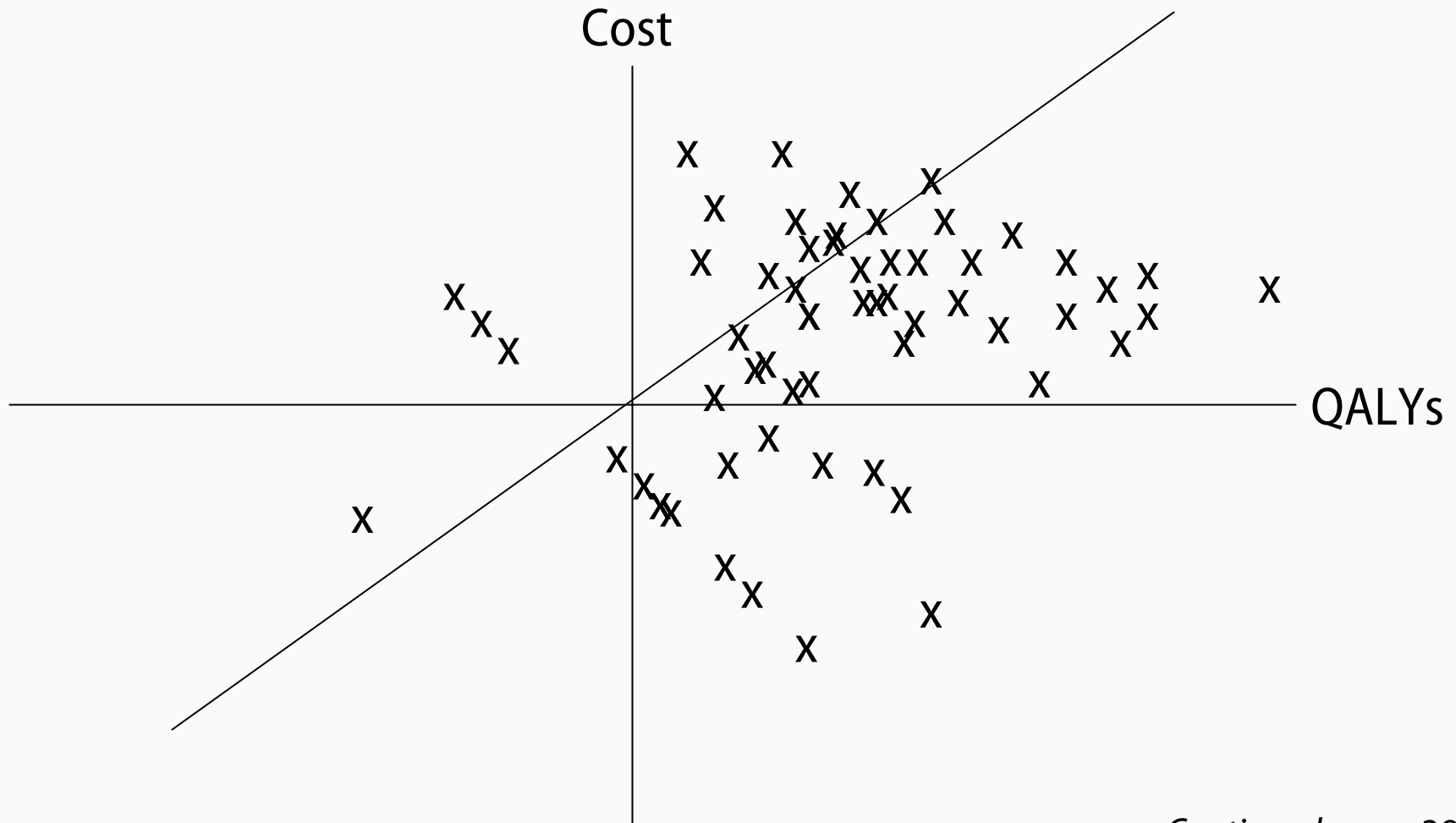
- ★ *What proportion of times the ICER is below the threshold*
- ★ *What proportion of times the ICER suggests that the less expensive alternative is dominated*
- ★ *And what proportion of times the ICER suggests that the less expensive alternative dominates the more expensive*

Simplest When Comparing Two Alternatives

Run a “bootstrapping” exercise to determine the following:

- ★ *What proportion of times the ICER is below the threshold*
- ★ *What proportion of times the ICER suggests that the less expensive alternative is dominated*
- ★ *And what proportion of times the ICER suggests that the less expensive alternative dominates the more expensive*

Bootstrapping Results with Reversed Axes



Bootstrapping Results with Reversed Axes

