## Example: WTP for a Test

Formally: Value of Information or "VOI"

## Strategy:

1. Replace price of test with variable $\mathbf{X}$
2. Solve for highest value of $X$ for which it's best to buy the test

Applying to previous car example:
Car price: $\$ 2500$

| Condition | Value | Probability |
| :--- | :--- | :--- |
| Good (G): | $\$ 4000$ | $30 \%$ |
| Bad (B): | $\$ 1000$ | $70 \%$ |

Infallible test:

| Condition | Report $r G$ | Report rB |
| :--- | :--- | :--- |
| G | $100 \%$ | $0 \%$ |
| B | $0 \%$ | $100 \%$ |

- Update: payoffs using $\mathbf{X}$ instead of $\$ 400$
- Omit the impossible branches for clarity


Evaluate the right-most nodes and simplify:


Evaluate and simplify again:

$E V=0.3(-X+1500)+0.7^{*}(-X)$
$E V=-X+0.3^{*}(1500)$
$E V=-X+450$

Finally:

- $N($ no action) beats $B$ since $\$ 0>-\$ 600$
- If $X=0 \mathrm{~T}$ (test) beats N (next best option) since $\$ 450>\$ 0$
- What's the maximum X where T is at least as good as N ?

$$
\begin{aligned}
& \text { Payoff from } \mathrm{T} \text { = payoff from next best option } \\
& \text { Payoff from } \mathrm{T} \text { = payoff from } \mathrm{N} \\
& -X+450=0 \\
& X=\$ 450
\end{aligned}
$$

Maximum WTP for the test: \$450 Thus, value of information: \$450

Connecting to previous example with $\$ 400$ test:

$$
\begin{aligned}
& W T P=\$ 450 \\
& P=\$ 400 \\
& C S=W T P-P=\$ 50
\end{aligned}
$$

