

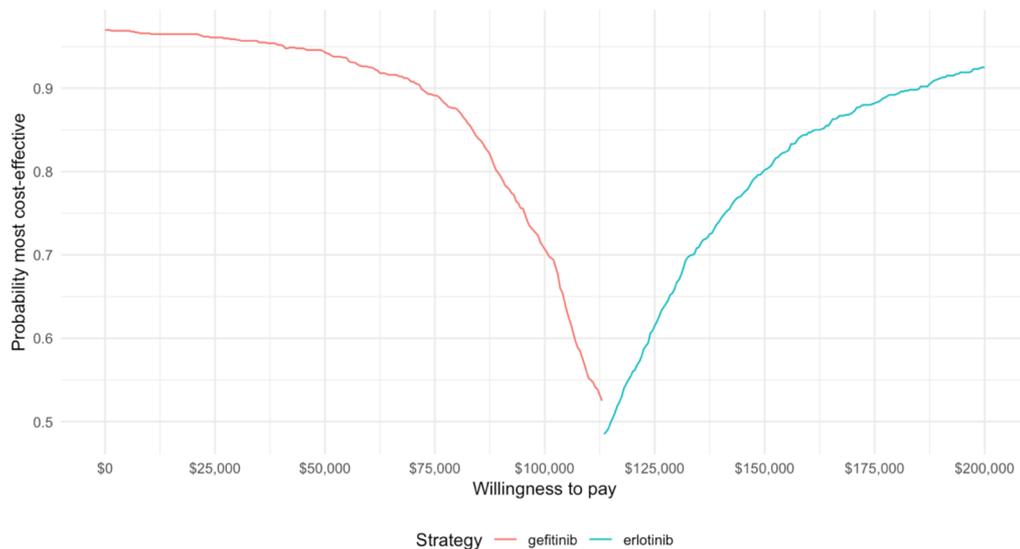
From theory to practice: making value assessments more flexible and comprehensive

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Conventional cost-effectiveness analysis

$$\text{Net monetary benefit} = \text{Willingness to pay} \times \text{Effectiveness} - \text{Costs}$$

Can account for opportunity cost of new treatment



Additional considerations beyond costs and health gains



Green circles: core elements of value
Light blue circles: common but inconsistently used elements of value
Dark blue circles: potential novel elements of value
Blue line: value element in traditional payer perspective
Red line: value element also included in societal perspective

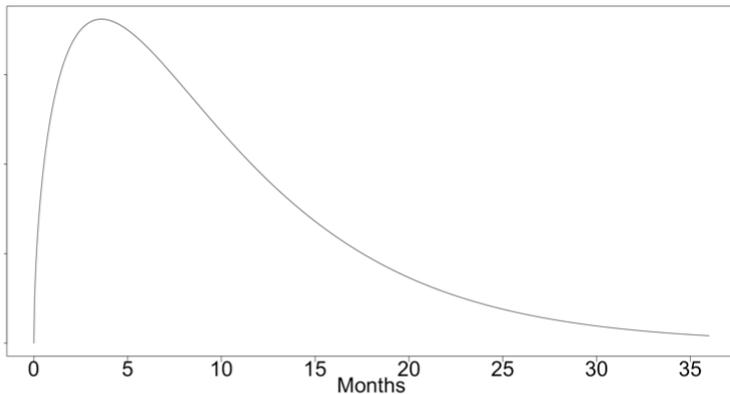
From theory to practice

- Can we incorporate these additional considerations into the standard CEA framework?
- Or are other techniques such a multi-criteria decision-analysis (MCDA) needed?
- Do these additional considerations have important impacts on estimates of value?

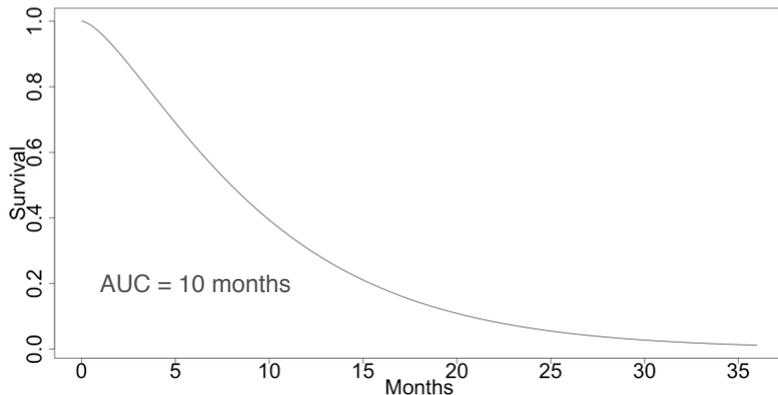
Value of hope

Treatment A: Mean survival of 10 months

Distribution of survival times

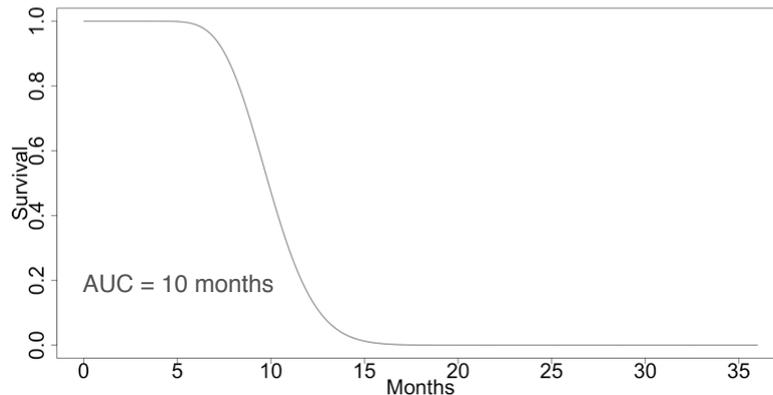
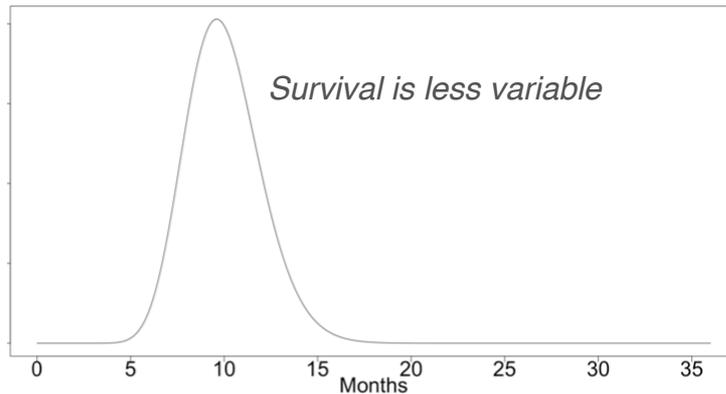


Survival curve

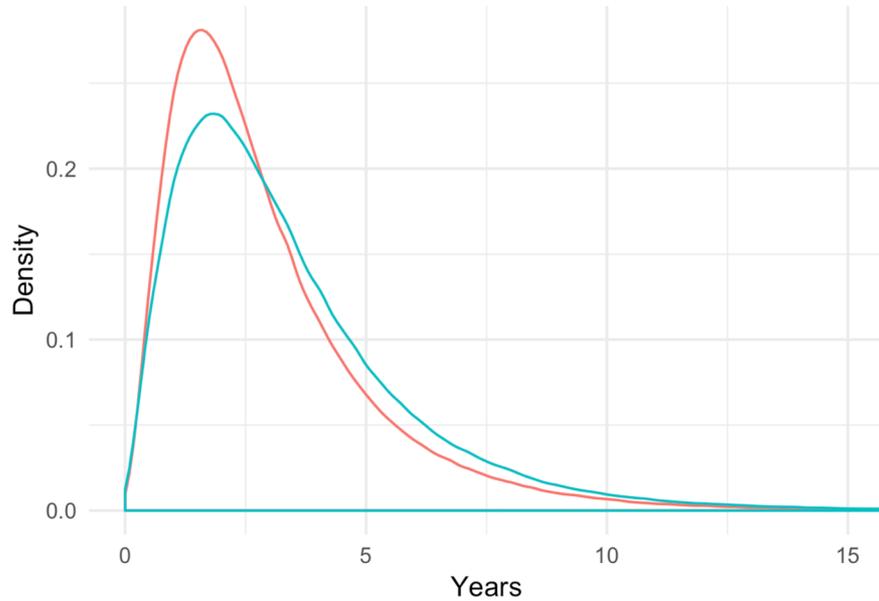


Treatment B: Mean survival of 10 months

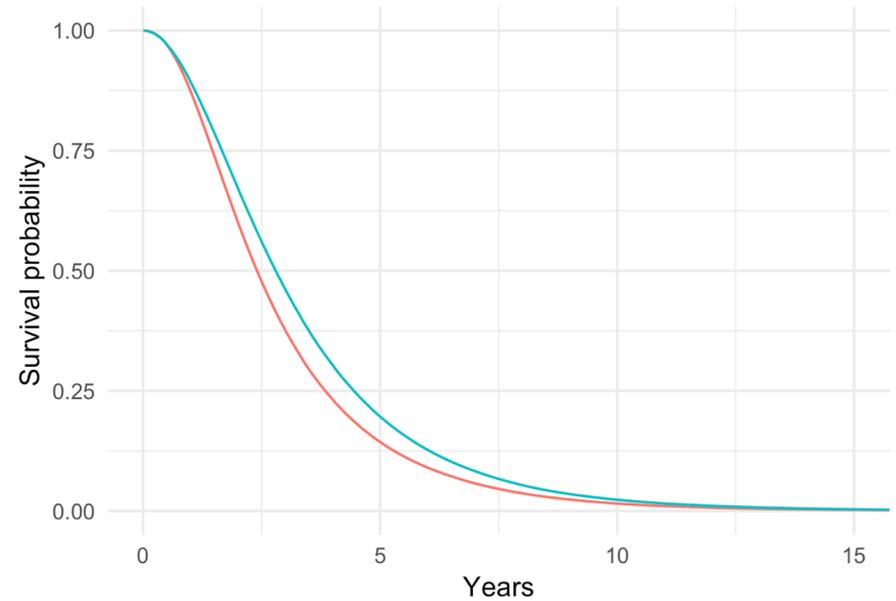
Survival is less variable



The value of hope in NSCLC



Gefitinib sequence Afatinib sequence



— Gefitinib sequence — Afatinib sequence

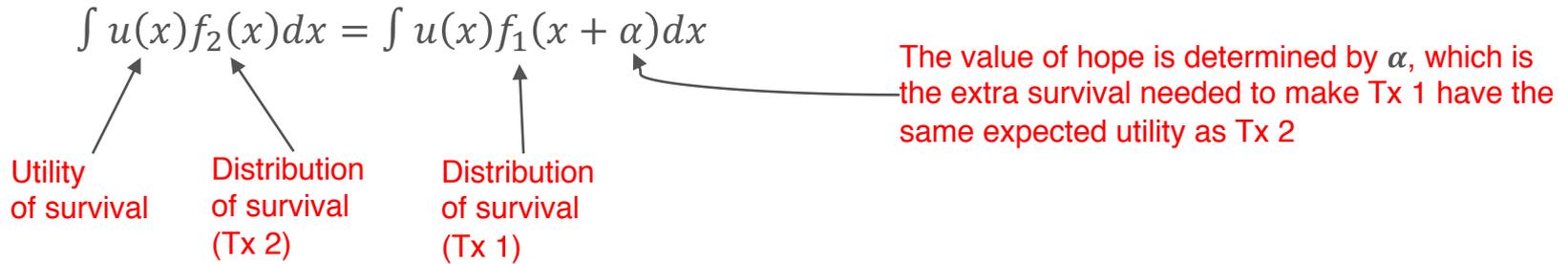
Can the value of hope be incorporated into conventional cost-effectiveness analysis?

- Concept of risk can be introduced with expected utility theory

$$\int u(x)f_2(x)dx = \int u(x)f_1(x + \alpha)dx$$

Utility of survival Distribution of survival (Tx 2) Distribution of survival (Tx 1)

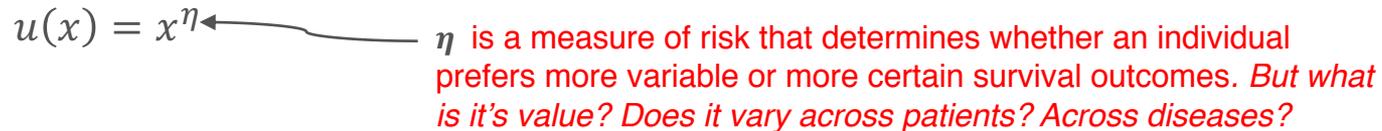
The value of hope is determined by α , which is the extra survival needed to make Tx 1 have the same expected utility as Tx 2



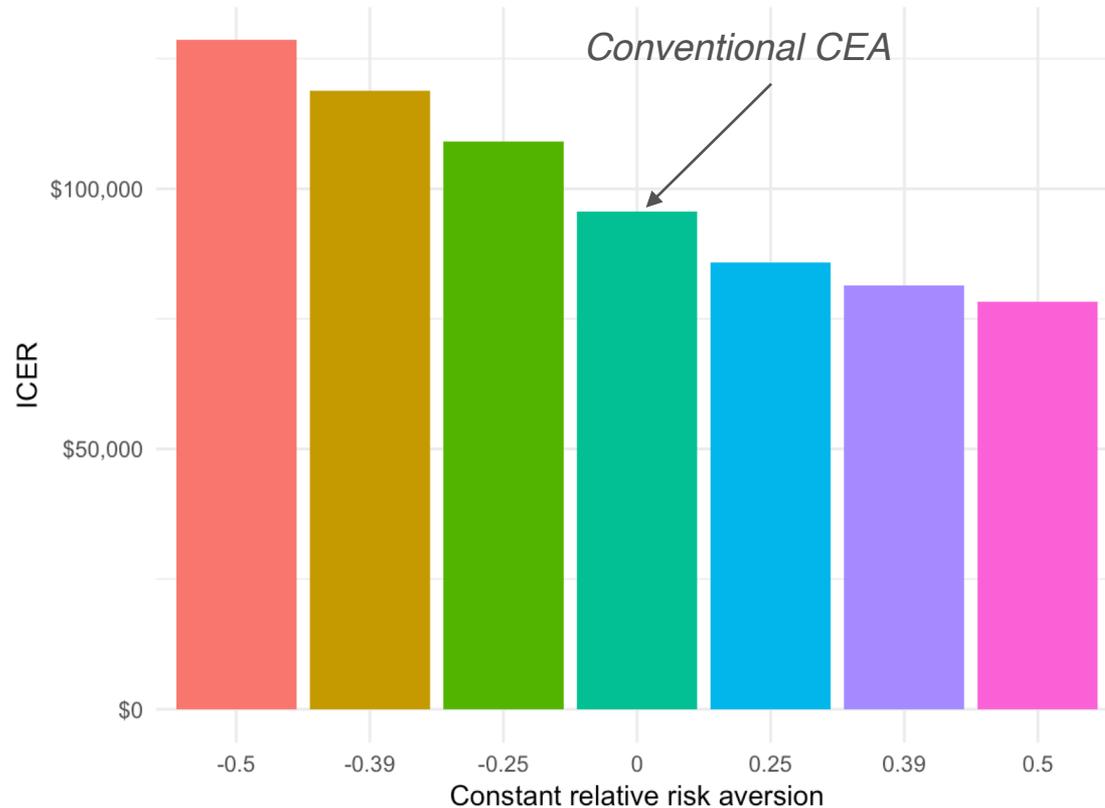
- What is the appropriate utility function? And even if we know the utility function, how do we parameterize it?

$$u(x) = x^\eta$$

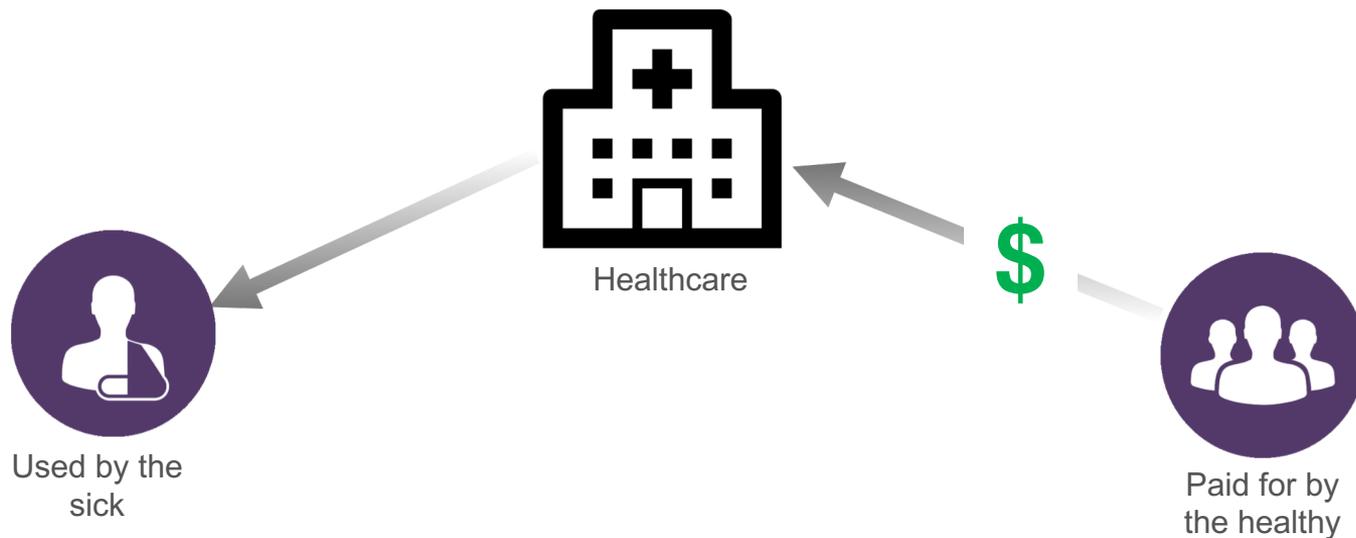
η is a measure of risk that determines whether an individual prefers more variable or more certain survival outcomes. *But what is its value? Does it vary across patients? Across diseases?*



Impact of value of hope on estimates of value in NSCLC (afatinib sequence relative to gefitinib sequence)



Insurance value



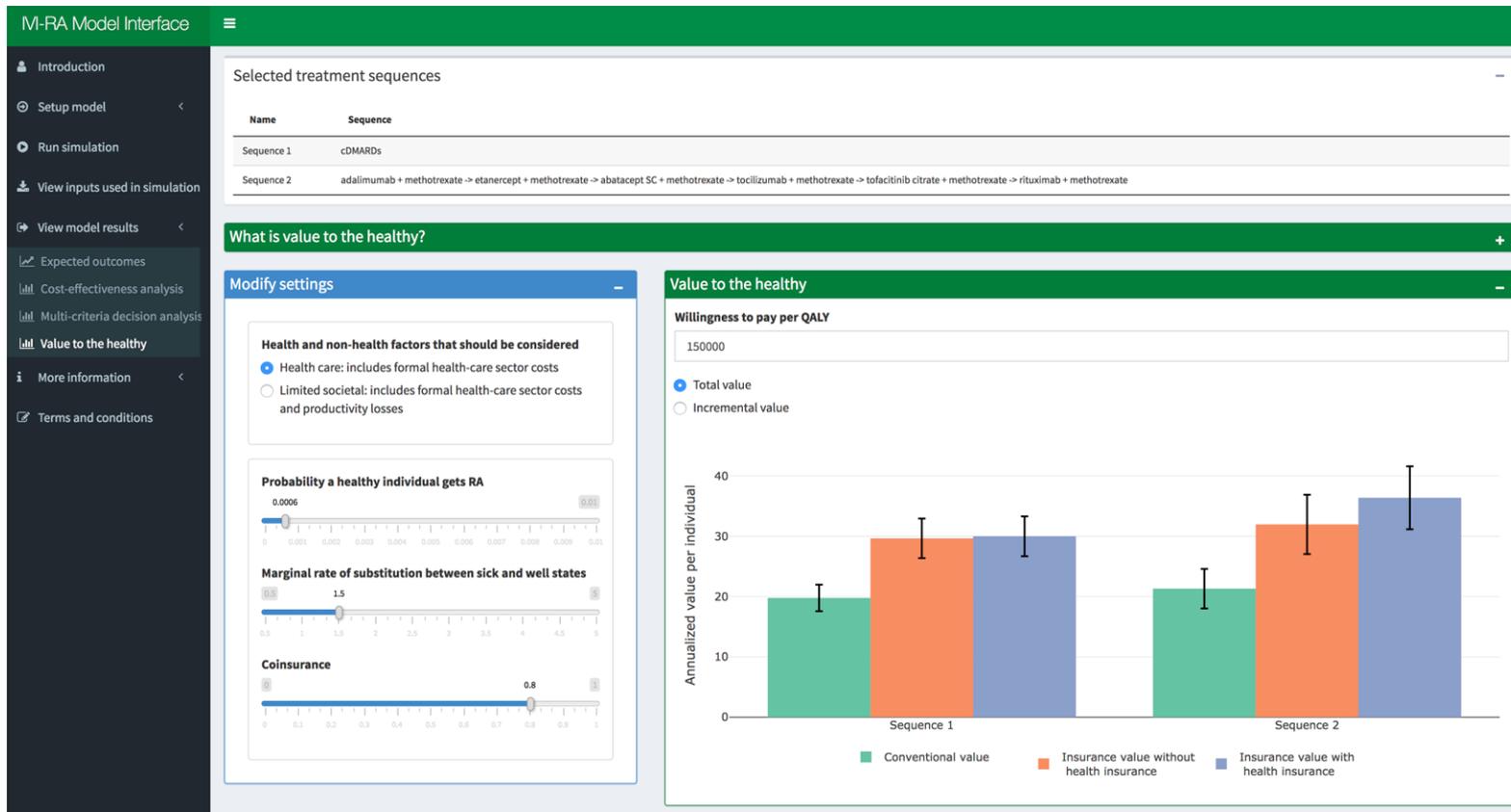
Conventional CEA: How much would sick people pay for technology to treat their illness?

Insurance value: What additional premiums or taxes would healthy people pay for technology?

Insurance value as “value to the healthy”

- To a healthy person, sickness is a future risk
- A health technology can help “insure” against the risk associated with future sickness
 - Reduces physical risk
 - Converts uninsurable physical risk into an insurable financial risk
- Lakdawalla et al. (2017) approach fits into conventional CEA framework but in a simplified one-period setting
 - Difficult to reconcile with longitudinal models of disease progression

Insurance value in rheumatoid arthritis



What about MCDA?

- In some cases it may be difficult to incorporate additional value considerations into conventional CEA
- MCDA provides a transparent manner to weight these “attributes” and is a natural complement to CEA
- But....
 - Opportunity cost is not typically incorporated into MCDA
 - Results are sensitive to weighting implying that care must be given to the techniques used to weight attributes and define their scale

Conclusion

- Conventional CEA is a well-tested framework for estimating the value of health technologies and making funding decisions
- Considering factors beyond health gains and costs in CEA is intriguing but requires more research
- Likewise, while MCDA can complement CEA, more research is needed to address some of the existing concerns