# Unlocking Pricing Power with Threshold Analysis: Conclusions from a Hypothetical Markov Model

Chalmers K,[1] Rinciog C,[1] Armand J[1]

[1]Symmetron Limited, London, England • Poster inquiries: jarmand@symmetron.net • www.symmetron.net • Presented at ISPOR EU 2024 Barcelona Annual Meeting

## Introduction

- Early economic models, developed to initiate discussions on cost-effectiveness and pricing, are often based on limited data.
- Threshold analyses can be used to explore decision uncertainty by assessing how cost effectiveness changes when adjusting one or more parameters over a range of plausible values.
- As companies formulate strategies for the pricing and positioning of new assets ahead of additional clinical evidence, threshold analyses are proving increasingly valuable for planning market access with early data and diverse outcomes **(Figure 1)**.

### Figure 1. Outcomes estimated in threshold analyses

**A threshold analysis can vary one or several parameters:**

**Achieve optimal ICER (HTA strategy)**

- To inform the **optimal ICER** that can be achieved when model parameters are varied.

$$ICER = \frac{CD_{TxA} - CD_{BSC}}{E_{TxA} - E_{BSC}} \leq WTP$$

**Achieve optimal price (pricing strategy)**

- To inform the **maximum achievable price** the manufacturer can charge to achieve or maintain cost-effectiveness. The maximum price is set so that ICER ≤ WTP threshold.

$$CD_{TxA} = ICER \times (E_{TxA} - E_{BSC}) + CD_{BSC}$$

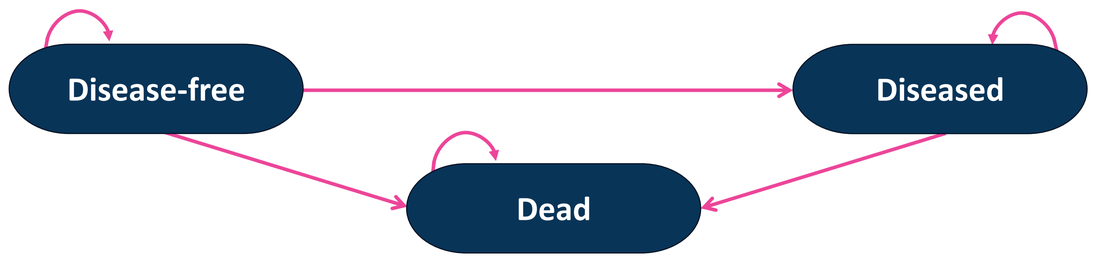
**Abbreviations:** BSC, best supportive care; CD, cost of drug; E, effectiveness; HTA, health technology appraisal; ICER, incremental cost-effectiveness ratio; TxA, treatment A; WTP, willingness-to-pay.

## Methods

- A hypothetical three-state Markov model comparing a new treatment (TxA) and best supportive care (BSC) was developed **(Figure 2).**
- Key outcomes were disease progression, discontinuation and hospitalisation, estimated with placeholder data. TxA was assumed to reduce disease progression and hospitalisation compared to BSC. Patients who discontinued TxA were treated with BSC.
- Key inputs were varied for TxA in one and two-way threshold analyses over plausible ranges to achieve the maximum price (reported as annual cost) so that the incremental cost-effectiveness ratio (ICER) was no more than the willingness-to-pay (WTP) threshold of £30,000 per quality-adjusted life year (QALY) gained **(Figure 1)**.

**Objective:** To explore how threshold analyses can be used to guide pricing and market access strategies when limited data is available.

### Figure 2. Hypothetical model structure




## Results

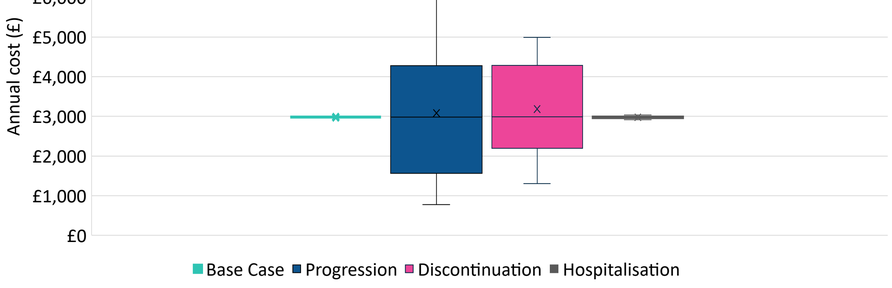
### Base-case analysis

- Given a willingness to pay threshold of up to £30,000 for one additional QALY gained, TxA was cost-effective up to a maximum annual cost of £2,979.

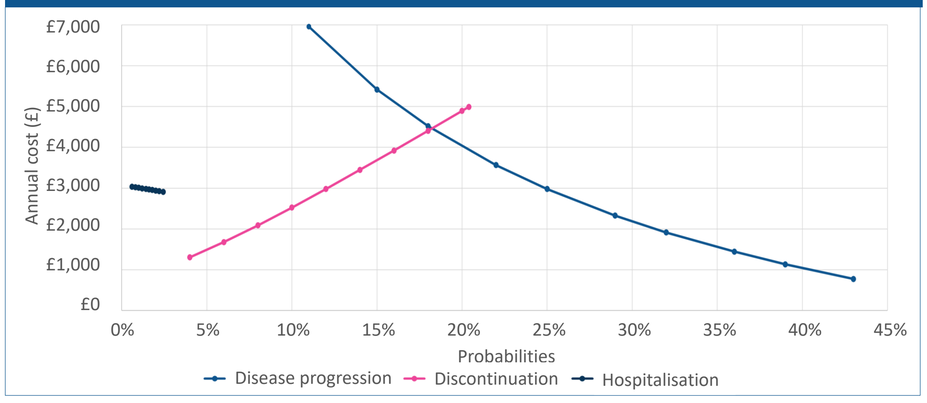
### One-way threshold analysis

- TxA efficacy parameters were varied to demonstrate their effect on the maximum annual cost at which TxA remained cost-effective **(Figure 3** and **Figure 4).**
- In this hypothetical model, treatment discontinuation and the rate of disease progression were key drivers of cost-effectiveness. They had a greater impact on the maximum cost (shown as variability of the annual cost) than hospitalisation **(Figure 3)**.

### Figure 3. One-way threshold analysis - impact on the annual cost




### Figure 4. One-way threshold analysis – inputs tested

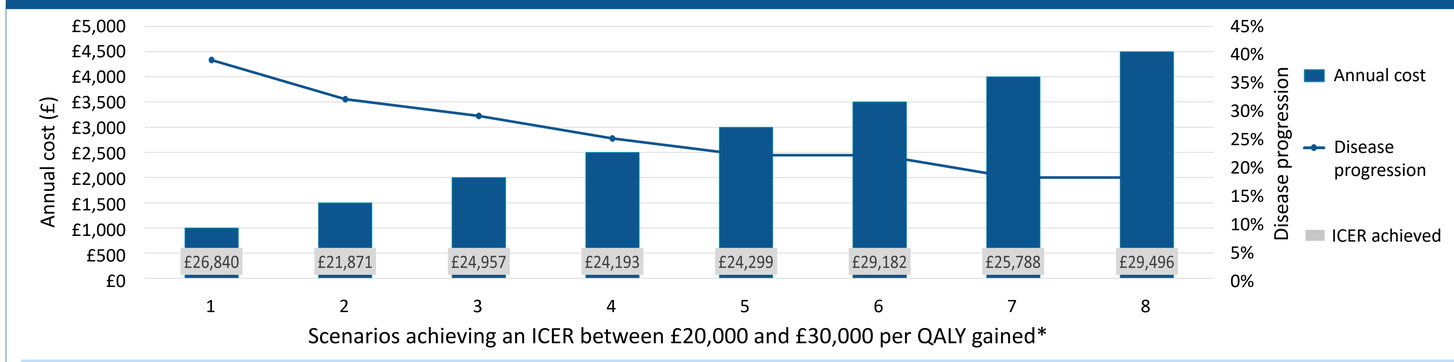



- **Disease progression** (varied between 11.00% and 43.00%) was inversely correlated with maximum annual cost (from £6,957 to £776).
- **Discontinuation** (varied from 3.60% to 20.40%) showed positive correlation with maximum annual cost (from £1,305 to £4,992).
- **Hospitalisation** (varied between 0.60% and 2.44%) had a minimal impact on maximum annual cost (£2,911 to £3,036).
- Overall, the highest maximum cost for TxA was achieved when the probability of disease progression was around 11%, keeping everything else constant **(Figure 4).**

### Two-way threshold analysis

- In the two-way threshold analysis, the cost of TxA was varied together with rates of disease progression **(Figure 5),** discontinuation **(Figure 6)** and hospitalisation **(Figure 7)**.
- Parameter estimates were varied by increments, so that ICERs were maximised up to the WTP threshold of £30,000 per QALY gained, as reported in the data labels.

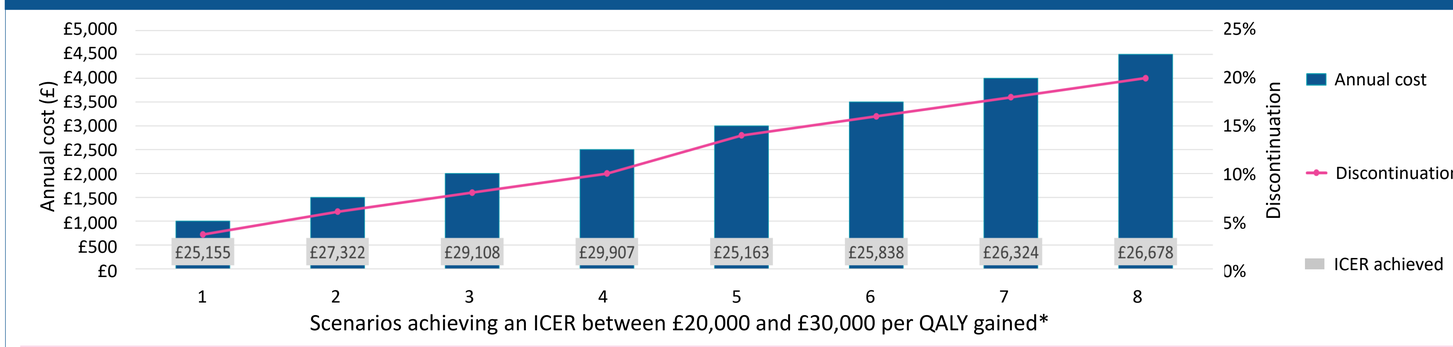
### Figure 5. Annual cost and disease progression




As the probability of **disease progression** decreased, the annual cost at which TxA was cost effective increased. Where the annual cost of TxA was £1,000, disease progression could be no more than 39.00% to be cost effective; at £4,500 per year, the probability could not exceed 18.00%.

**Abbreviations:** ICER, incremental cost-effectiveness ratio; QALY, quality-adjusted life year.; TxA, treatment A; WTP, willingness-to-pay.

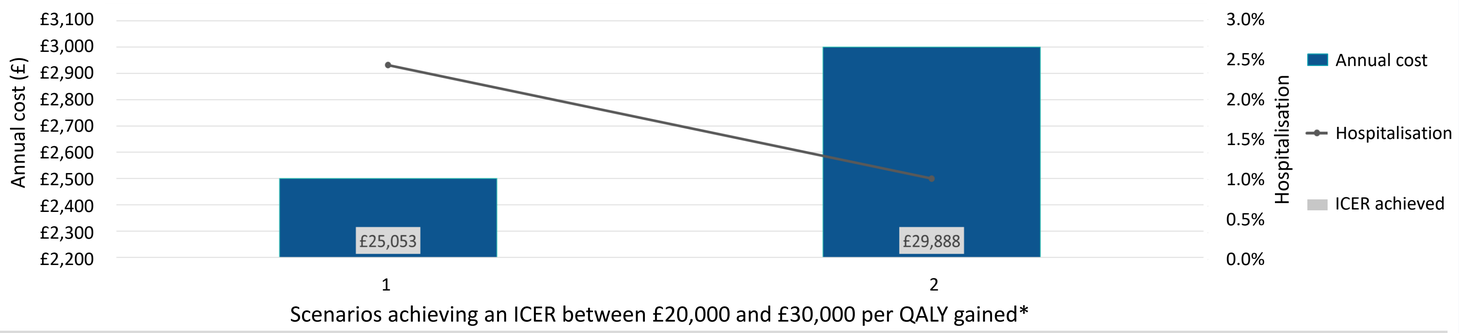
### Figure 6. Annual cost and discontinuation




As the probability of **discontinuation** increased and fewer patients were on TxA, the annual cost at which TxA was cost effective increased. Where the annual cost of TxA was £1,000, discontinuation would need to be 3.6% or higher; at £4,500 per year, the probability could not fall below 20.00%.

**Abbreviations:** ICER, incremental cost-effectiveness ratio; QALY, quality-adjusted life year.; TxA, treatment A; WTP, willingness-to-pay.

### Figure 7. Annual cost and hospitalisation




The probability of **hospitalisation** had little impact on the results. Where the annual cost of TxA was £2,500, hospitalisation could be no more than 2.44%; at £3,000 per year, the probability could not exceed 1.00%.

**Abbreviations:** ICER, incremental cost-effectiveness ratio; QALY, quality-adjusted life year.; TxA, treatment A; WTP, willingness-to-pay.
*Only scenarios resulting in an ICER between £20,000 and £30,000 per QALY gained were reported, scenarios resulting in dominance of the comparator were excluded.

## Conclusions

### Implications

- Threshold analyses help to demonstrate how variation in key parameters influences value, to quantify uncertainty, and to test aspirational claims of clinical effectiveness and safety. They are particularly useful in early models to inform strategic and pricing decisions before evidence from phase 3 clinical trials become available.
- Not only do threshold analyses explore the impact on ICERs, but they can also be re-worked to show how the maximum price can be achieved while maintaining the ICERs at an optimal level. Multi-way analyses can identify the maximum achievable price over multiple scenarios.
- Results from such analyses can inform planning for price adjustments - whether increases or discounts - so that manufacturers can take advantage of pricing opportunities.

### Limitations

- This analysis was a hypothetical case study aiming to explore the functionalities of threshold analyses in a simplified model with placeholder data.
- Inputs were varied by increments, therefore the parameter inputs estimated to maximise value are approximate.
- The manufacturers should expect to refine pricing strategies as the economic model is developed in an iterative manner as it incorporates new evidence.

***Declaration of funding:*** *This project has been funded in full by Symmetron Limited.*