

Development and Validation of a Novel Copula-Based Method for Cross-Country EQ-5D Utility Value Conversion

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Disclosures

Speaker disclosures — ISPOR 2026

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- All views are the speaker's own; data and conclusions are independent of any product or manufacturer

30 years of EQ-5D valuations

90 country tariffs, 282 mapping studies¹, just one X-country algorithm²

Evolution of EQ-5D value sets and mapping algorithms, 1997-2026

44 × EQ-5D-3L tariffs + 46 × EQ-5D-5L tariffs + 282 distinct HERC studies targeting EQ-5D — country-specific valuations expand worldwide



1. Dakin et al. 2025. HERC database of mapping studies, Version 10.0 (Last updated: 7th November 2025). <https://doi.org/10.5287/ora-bdrvmv9mn>
2. Omar Alsaleh et al. *Clinicoecon Outcomes Res.* 2025;17:797-808. <http://dx.doi.org/10.2147/CEOR.S532010>

The Global HTA Challenge

One utility study × either 44 or 46 country tariffs

- Individual patient data is required to recompute utility values for each new country tariff
- Nearly 50 country-specific EQ-5D value sets are now available for each instrument
- Each new market traditionally means a fresh utility study: fieldwork, ethics, data collection
- Meta-analysis of health state utility studies not currently possible
- Result: delayed global access, inflated HEOR budgets, inequities in HTA decision-making

Standing on the Shoulders of Giants

Methodological foundation: Hernandez-Alava et al. (2020)¹

- *"If I have been able to see further, it is only because I am standing on the shoulders of giants."* — Sir Isaac Newton, 1676
- Hernandez-Alava et al. (2020): copula-based health-state mapping
- Accepted by NICE for utility-value derivation in HTA submissions
- Our work repurposes their algorithm — no new statistical machinery required

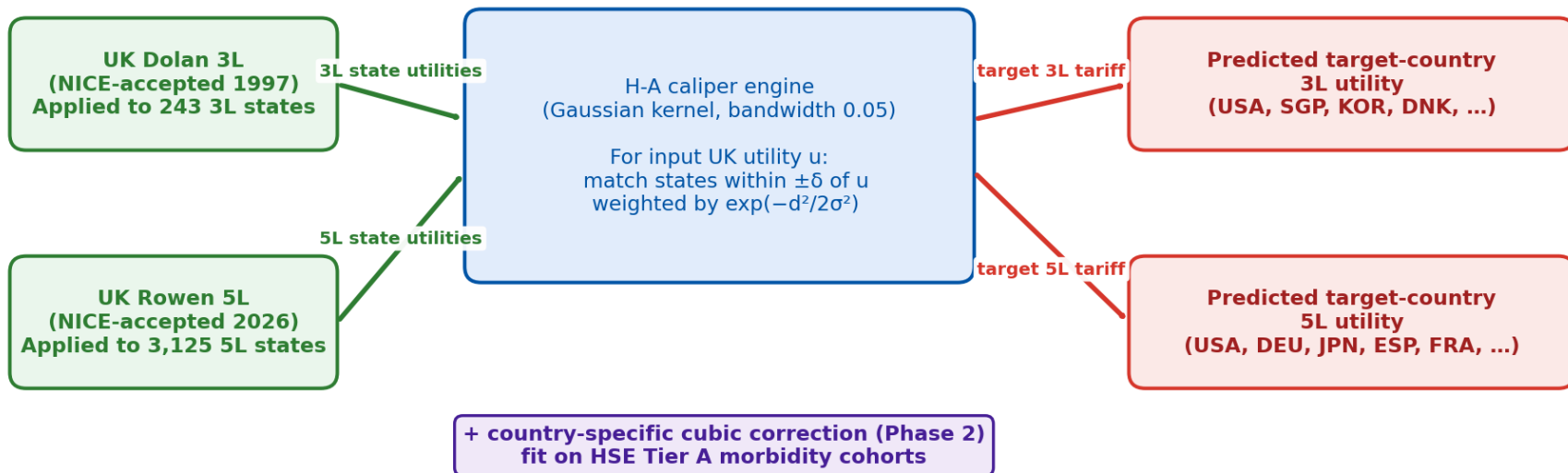
1. Hernández Alava M, Pudney S, Wailoo A. *Estimating the Relationship between EQ-5D-5L and EQ-5D-3L: Results from an English Population Study*. Policy Research Unit in Economic Methods of Evaluation in Health and Social Care Interventions; 2020.

Methodology

H-A caliper + the NICE-accepted UK anchors (Dolan 3L¹, Rowen 5L²)

The caliper is anchor-agnostic: pair it with whichever UK tariff NICE currently accepts

For 3L workflows: Dolan TTO 1997 · for 5L workflows: Rowen TTO 2026 (NICE 2026)



1. Dolan P. Modeling valuations for EuroQol health states. *Med Care* 1997; 35(11): 1095-108
2. Rowen D, Mukuria C, Bray N, et al. A United Kingdom value set for the EQ-5D-5L. *Value Health*. 2026;0(0). doi:10.1016/j.jval.2026.03.008

Phase 1 Validation — Design

Van Wilder et al. (2019) SLR¹, 389 paired cohorts, 13 target countries

- Source: Van Wilder et al. (2019) — published systematic review of EQ-5D utilities across countries
- 389 paired aggregate utilities, 13 country tariffs (Americas, Europe, Asia-Pacific)
- Multiple chronic disease states represented; out-of-sample test against published values
- Validation metrics: Pearson r and Spearman ρ , MAE, RMSE, Bland–Altman agreement

1. Van Wilder L, Rammant E, Clays E, Devleeschauwer B, Pauwels N, De Smedt D. A comprehensive catalogue of EQ-5D scores in chronic disease: results of a systematic review. *Qual Life Res.* 2019;28(12):3153-3161.

Phase 1 Results

Variable country-level concordance



- Overall: Spearman $\rho = 0.556$, Pearson $r = 0.391$, MAE = 0.051, RMSE = 0.091, N = 389
- Each point: one paired observation from the Van Wilder catalogue, colour-coded by country tariff
- Strong agreement for US (Spearman $\rho = 0.769$, MAE = 0.026)
- Weaker for Singapore (MAE = 0.226) and other small-N tariffs — visible heterogeneity

Phase 1 stress test where the H-A caliper alone fails

Phase 1 Van Wilder external test — countries with $n \geq 10$ paired observations

H-A caliper alone, no correction. Where the method failed defined Phase 2's rescue agenda.

Country	n	MAE	Bias	Pearson r	Status	Reading
USA	278	0.026	-0.011	0.724	OK	<i>Already at noise floor</i>
Korea	34	0.092	-0.090	0.266	POOR	<i>Large bias, weak correlation</i>
Singapore	27	0.226	-0.221	0.363	CATASTROPHIC	<i>Bias = MAE; structural mis-scaling</i>
Denmark	14	0.050	-0.004	0.299	MEDIOCRE	<i>Bias ≈ 0 but rank order poor</i>

USA shows the inherent paired-observation noise floor (≈ 0.025). KOR / SGP / DNK each fail differently — each motivates a different shape of country-specific correction.

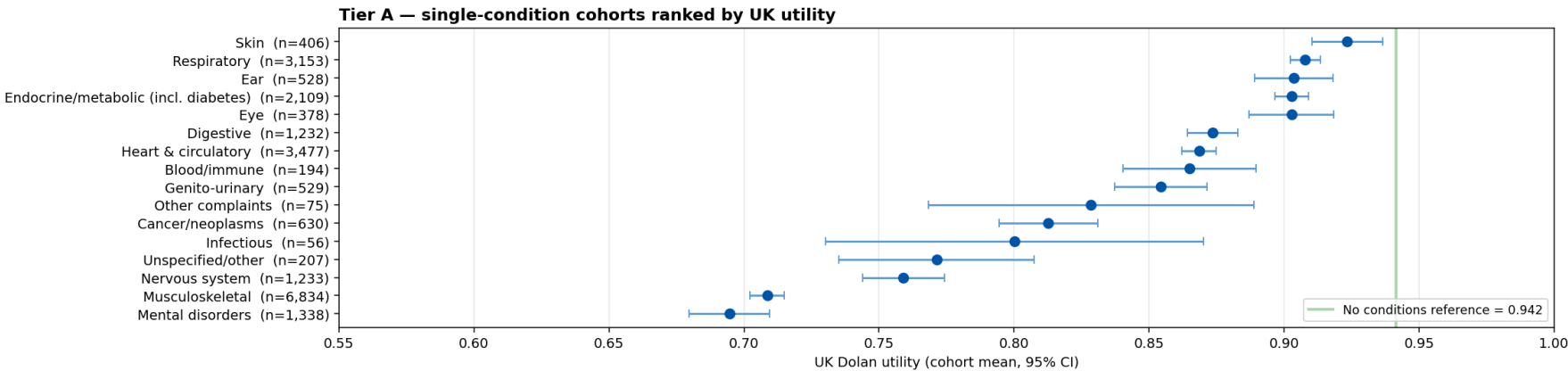
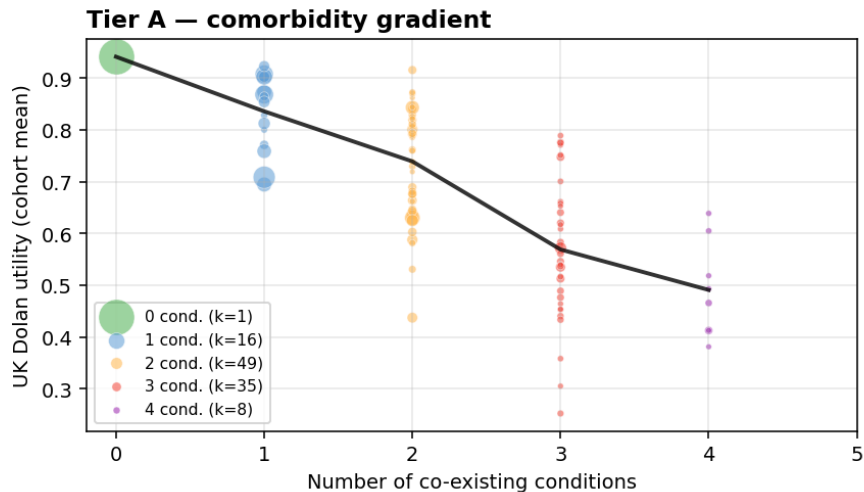
Phase 2 validation

Using multiple years of the Health Survey for England

- Eleven years pooled (2003–2018), total N = 149,596 respondents
 - EQ-5D-3L: 9 years (2003–2014) · n = 129,364
 - EQ-5D-5L: 2 years (2017–2018) · n = 20,232
- Per respondent:
 - comprehensive sociodemographic status
 - full EQ-5D profile
 - diagnosed conditions
 - healthcare resource use
 - clinical observations
- Source: UK Data Archive
 - Publicly available at zero acquisition cost
 - For non-commercially funded research
 - De-identified IPD, ethically approved

Phase 2 sense check

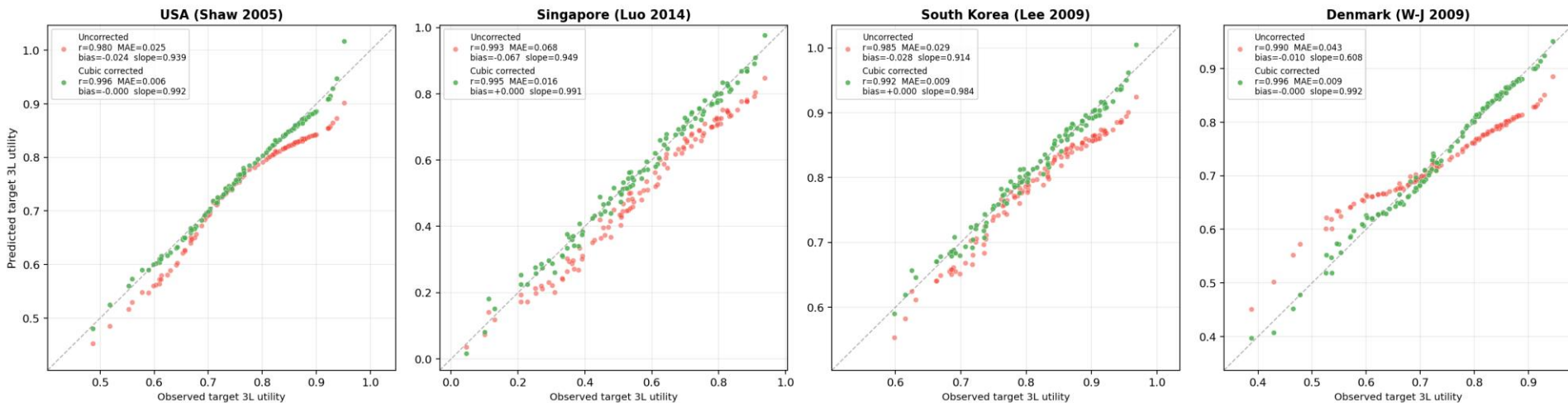
HSE Tier A morbidity cohorts (n = 109) respect EQ-5D's health-utility semantic



Phase 2 results (3L)

Locked cubic baselines on Tier A, all four Phase-1-stressed countries

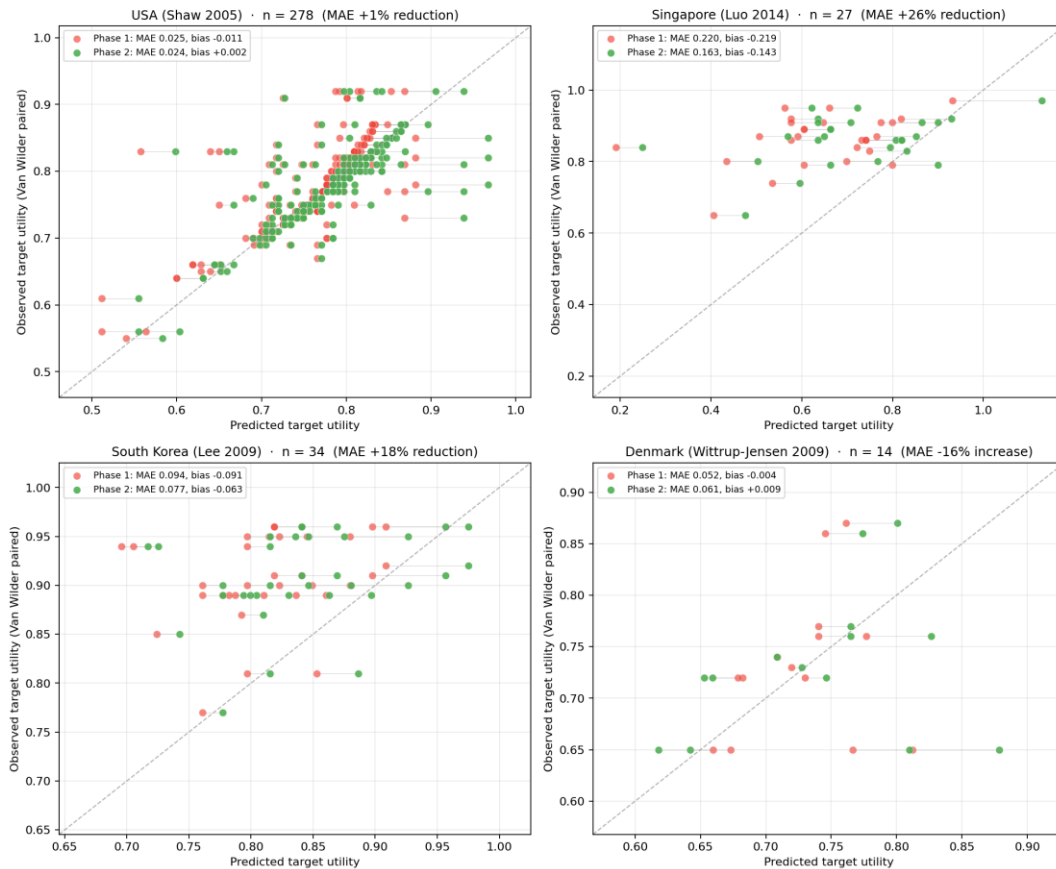
Phase 2 — locked cubic baselines on HSE Tier A morbidity cohorts (n=109 each)



Closing the Phase 1 loop

Tier-A-locked cubics applied to the original Van Wilder pairs

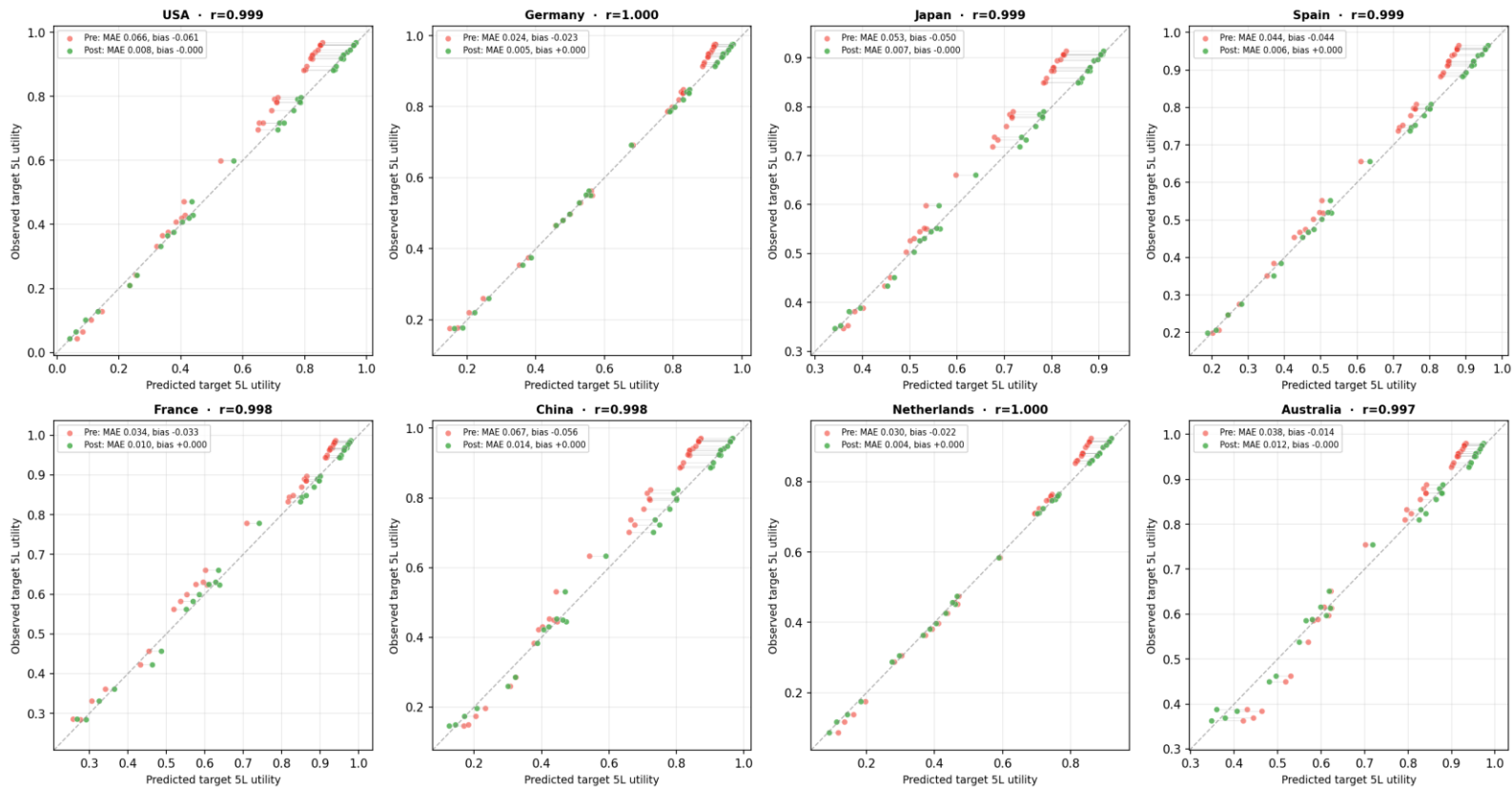
Phase 1 → Phase 2: Van Wilder external test with Tier-A-locked cubic corrections



Phase 2 results (5L)

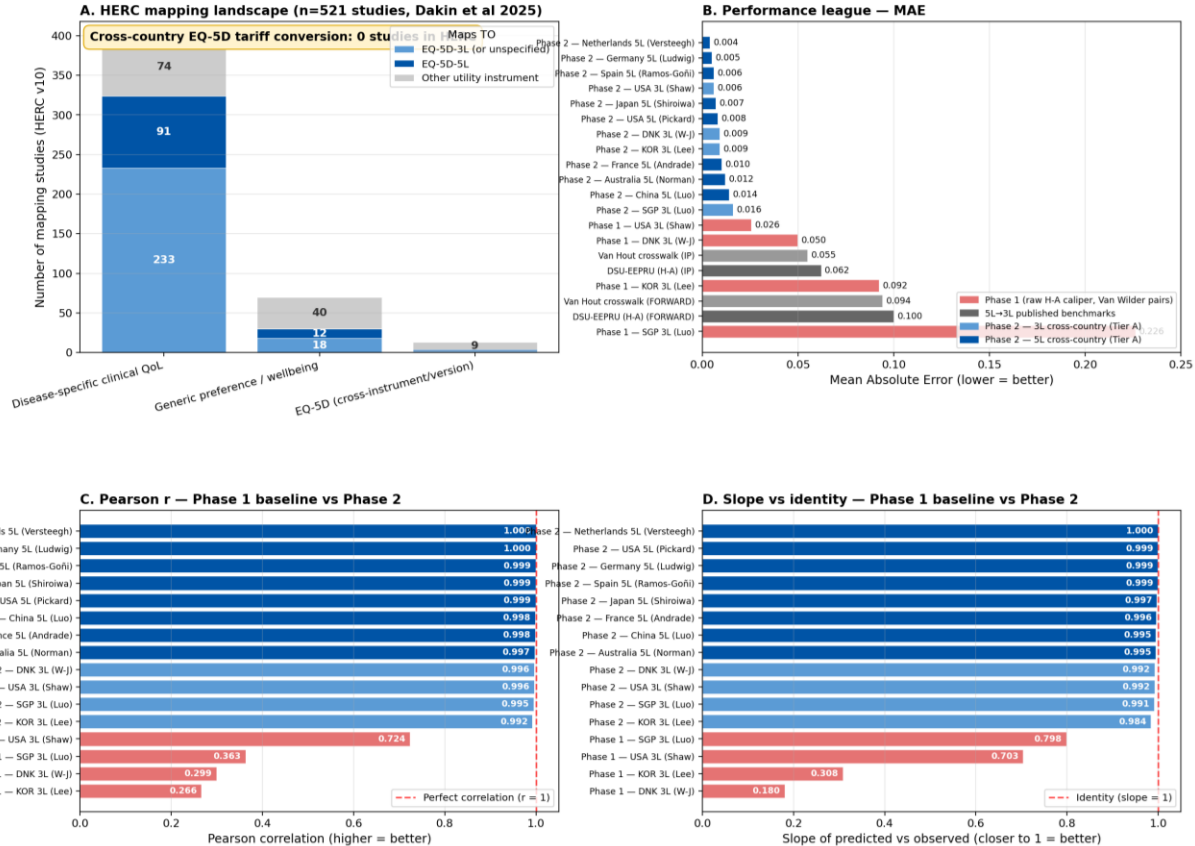
Eight target tariffs anchored on UK Rowen

Rowen-anchored 5L cross-country conversion — 8 country tariffs
HSE Tier-A-equivalent cohorts (n cohorts = 38)



Phase 2 vs the HERC catalogue

A category-defining performance leap



From method to manufacturer decision

What changes for HTA submissions in the next year

- Before: a fresh utility study per country (multi-year delay, repeated cost), or a UK proxy that risks HTA rejection
- After: one UK utility → 90 country tariffs in seconds — submission-ready evidence
- No additional IPD required for conversion itself; re-use existing trial, RWE, or literature-derived utility values
- Auditable, NICE-grounded methodology — UK Dolan + Rowen anchors, transparent cubic, reproducible outputs
- Cross-jurisdiction meta-analysis enabled — common denominator across published utility evidence
- Many fewer studies per global submission · months instead of years to evidence-ready · global HTA reach from a single UK utility input

Conclusions & impact

A category-defining algorithm filling a 30-year gap in HEOR practice

- ACHIEVED — first systematic cross-country EQ-5D conversion library
- VALIDATED — Rowen + Dolan anchored, HSE Tier A morbidity cohorts, in-sample $r \geq 0.99$ across 12 countries
- POSITIONED — Phase 2 fills a niche the HERC catalogue does not address
- IMPACT — Global HTA reach from a single UK utility input; cross-jurisdiction meta-analysis enabled
- FUTURE — Extend the locked-cubic library to the full 90-tariff catalogue; explore dimension-aware corrections at low utility tails
- Open to collaboration: christopher.poole@cencora.com