

Validation of four EQ-5D-5L crosswalk prediction models from PROMIS-29 in patients with cardiovascular disease

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Background

The EQ-5D-5L crosswalk (EQ-5D) is a preference-based score to estimate quality-adjusted life years (QALY) in cost-effectiveness analyses. The descriptive PROMIS-29 profile is a patient-reported outcome measure used in clinical routine and research. Four different mapping models (US, Germany, United Kingdom, France) are available to predict the country-specific EQ-5D from PROMIS-29 scores, but these have not yet been tested in independent clinical data.

Methods

**Population:** Observational clinical cohort of patients with cardiovascular disease

**Samples:** Baseline  $n_1=1118$ , follow-up  $n_2=565$

**Prediction performance at baseline:**  $EQ-5D_1 - \hat{EQ-5D}_1$

**Prediction performance of changes:**  $(EQ-5D_2 - EQ-5D_1) - (\hat{EQ-5D}_2 - \hat{EQ-5D}_1)$

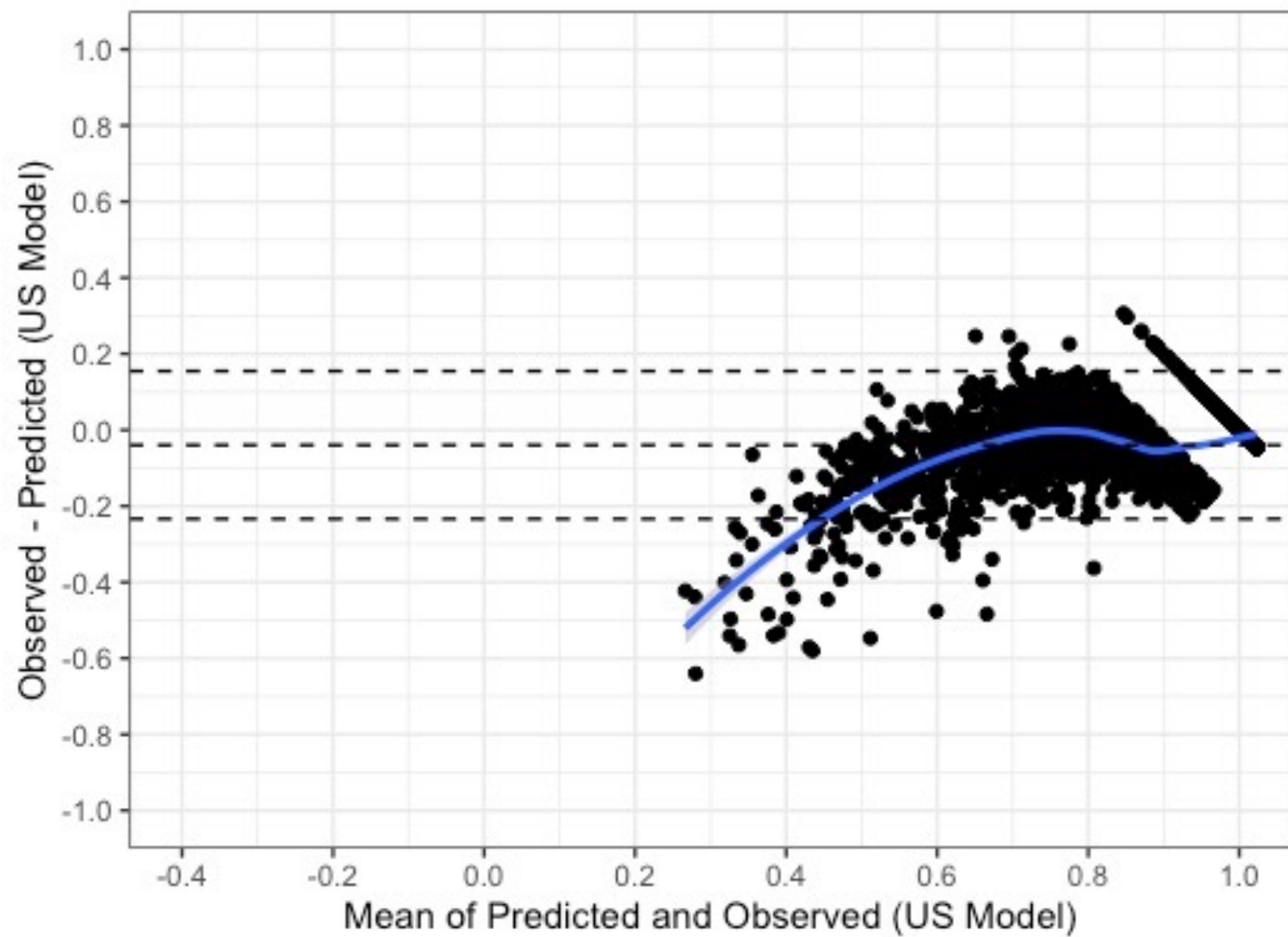
**Measures of accuracy and agreement:** Normalized root mean square error (nRMSE), normalized mean absolute error (nMAE), intraclass correlation coefficient (ICC),  $R^2$ , and Bland-Altman plots with 95% Limits of Agreement (95%-LoA).

Objectives

- Investigate the models' prediction performance of all four models at baseline data
  - Investigate prediction the models' performance of changes over time in longitudinal data
  - Identify reasons for different performances

Results at baseline

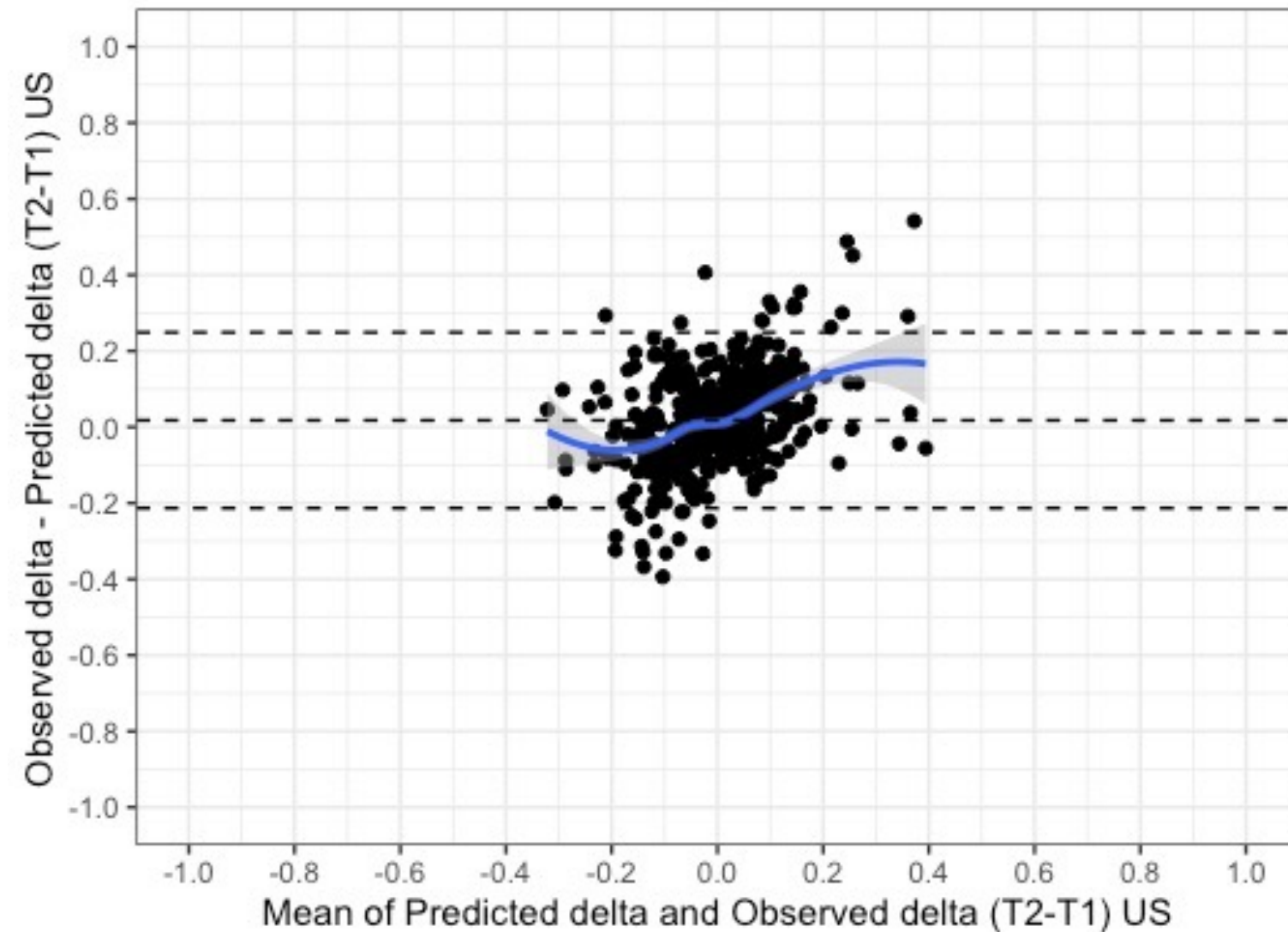
|                |       |
|----------------|-------|
| Bias           | -0.04 |
| nRMSE          | 0.096 |
| nMAE           | 0.070 |
| ICC            | 0.77  |
| R <sup>2</sup> | 0.66  |



Models

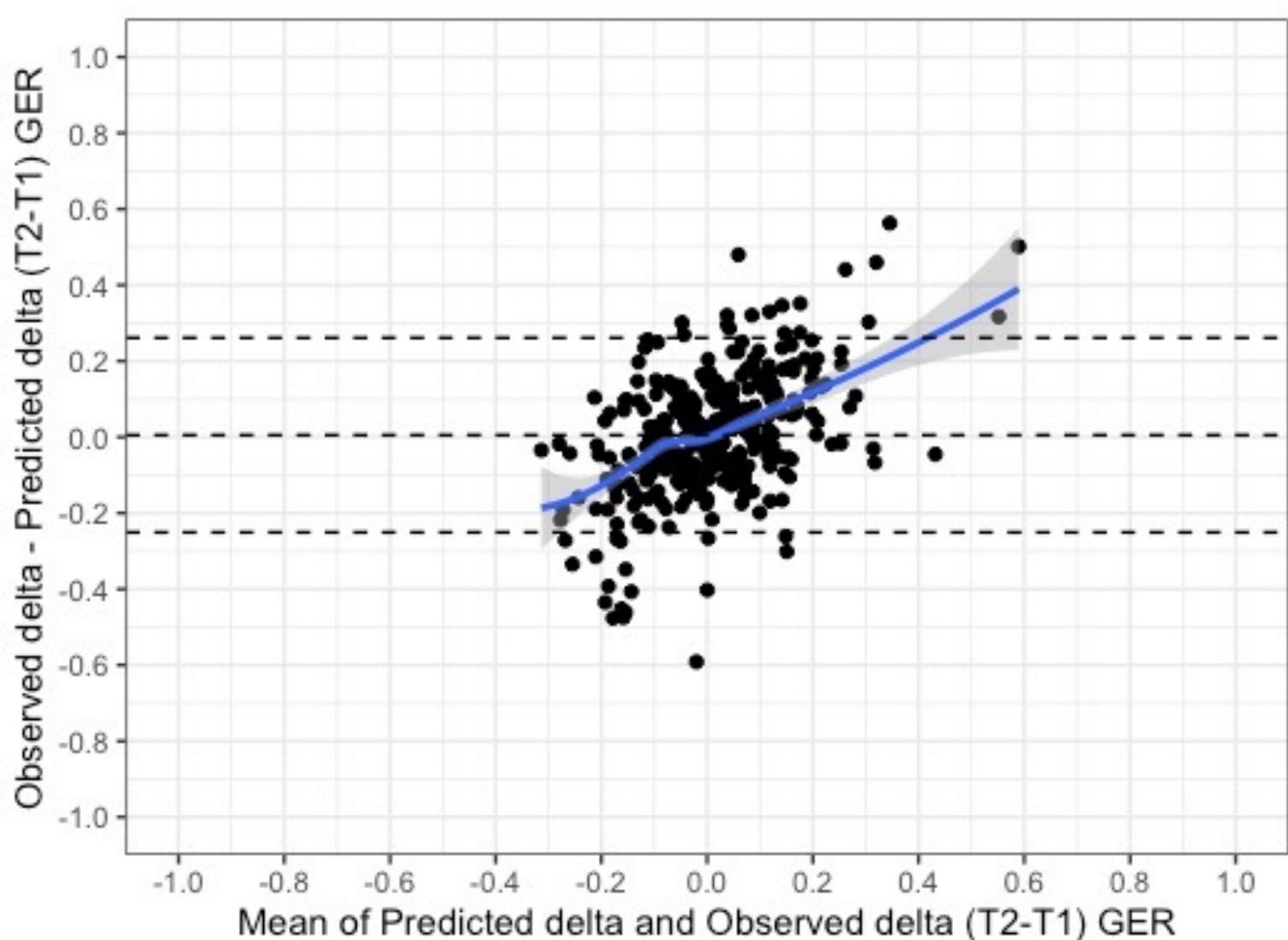
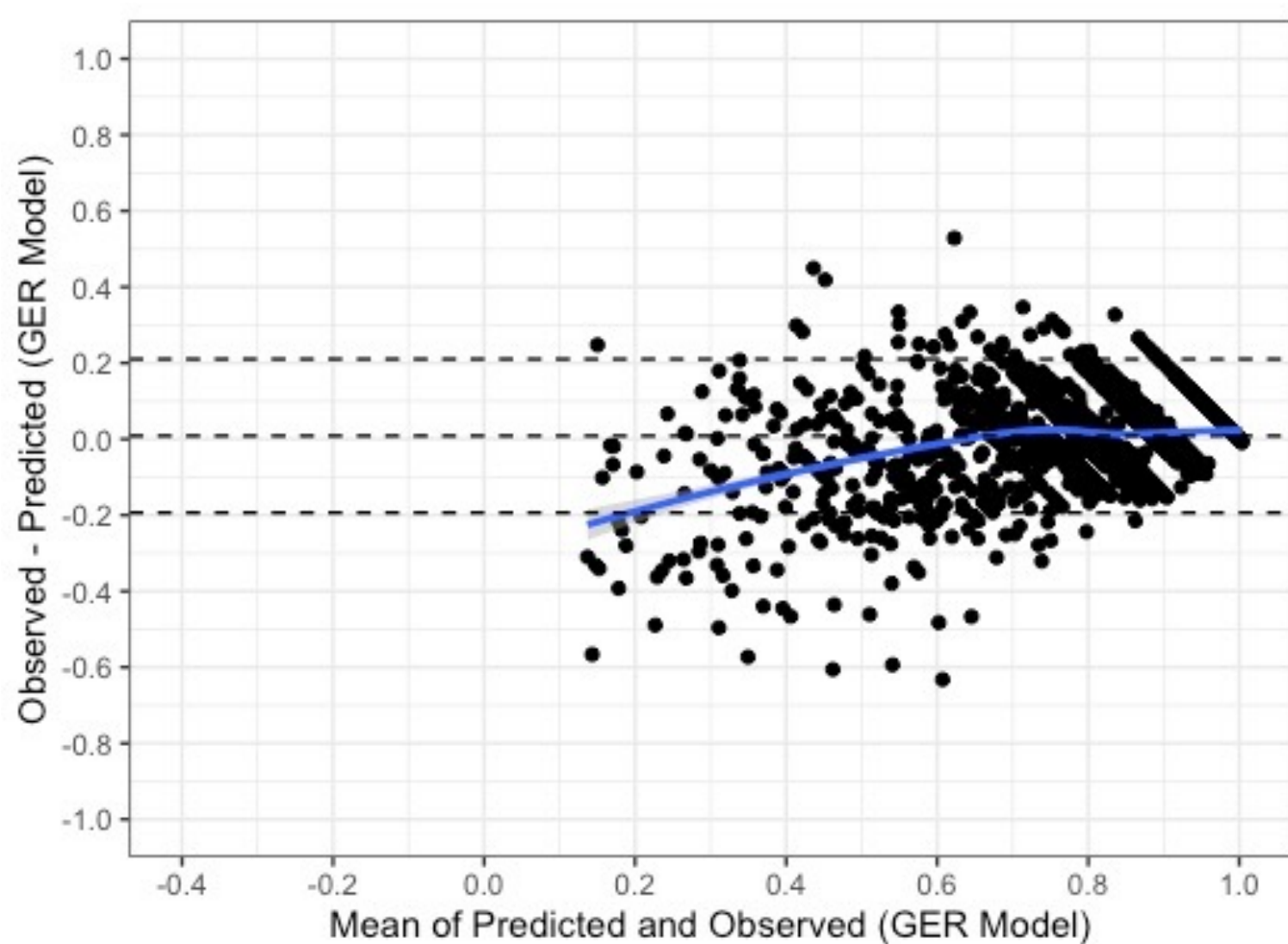


Results of changes



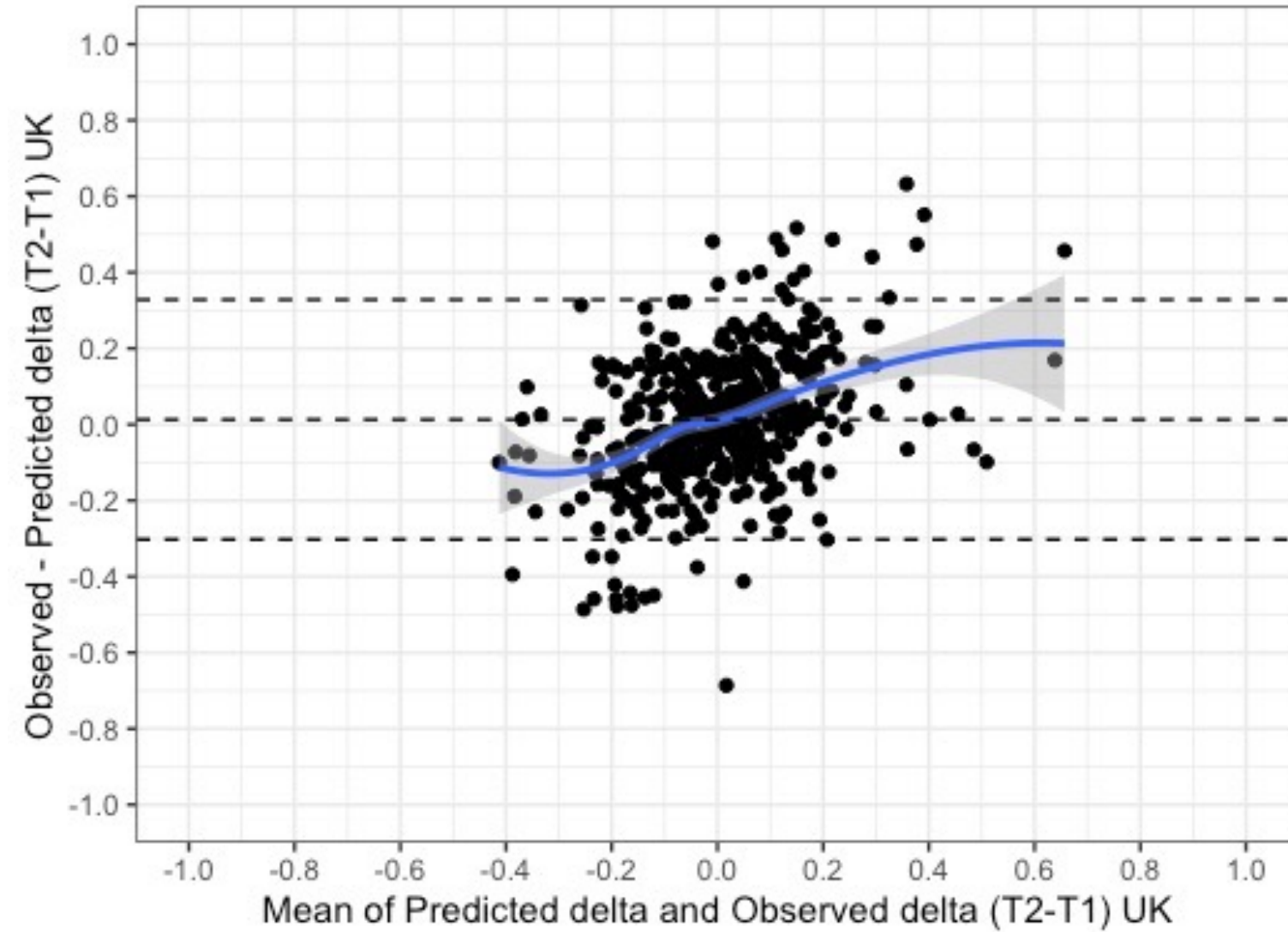
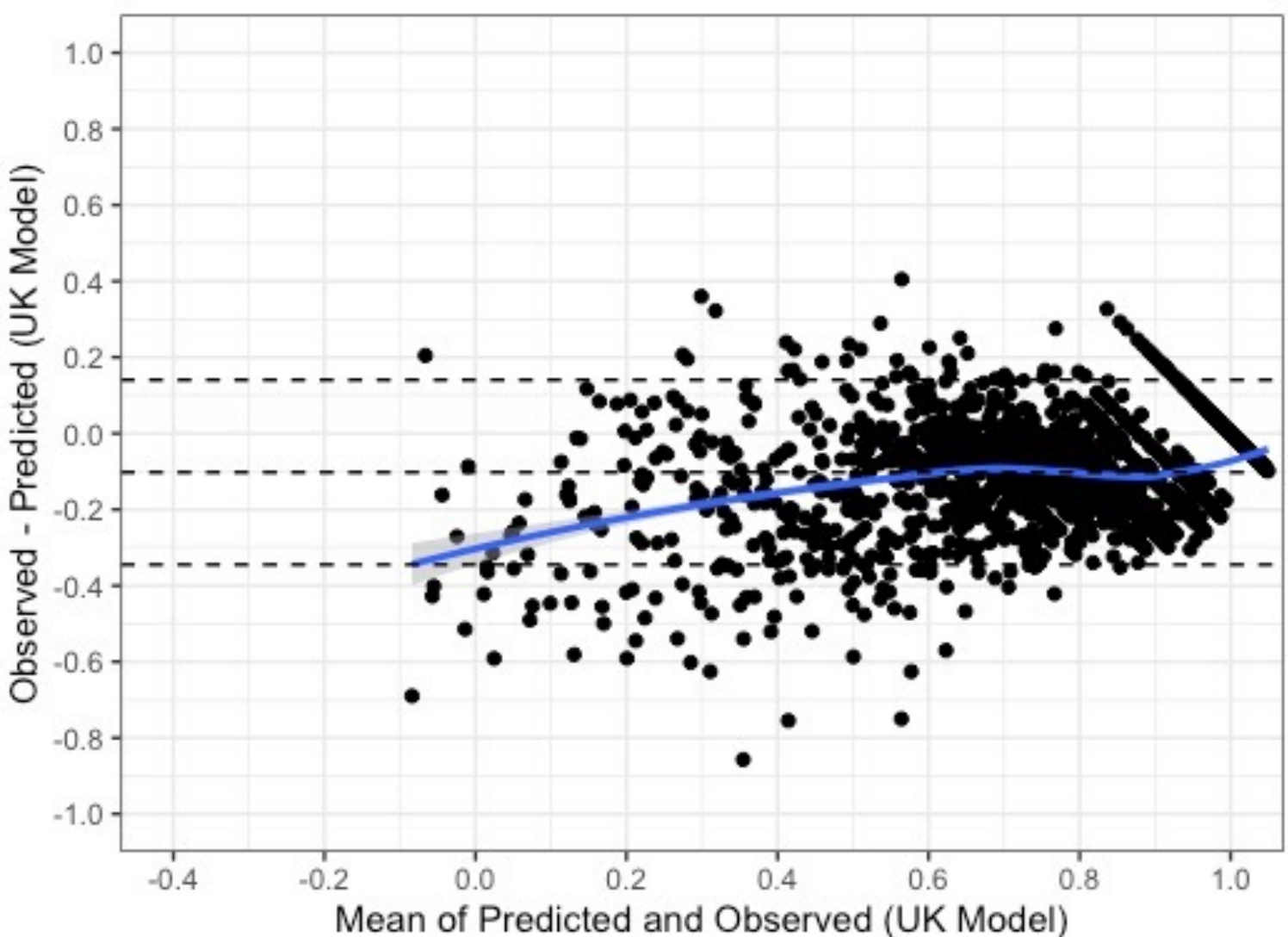
|                |       |
|----------------|-------|
| Bias           | 0.018 |
| nRMSE          | 0.108 |
| nMAE           | 0.078 |
| ICC            | 0.45  |
| R <sup>2</sup> | 0.23  |

|                |       |
|----------------|-------|
| Bias           | 0.01  |
| nRMSE          | 0.086 |
| nMAE           | 0.059 |
| ICC            | 0.83  |
| R <sup>2</sup> | 0.70  |



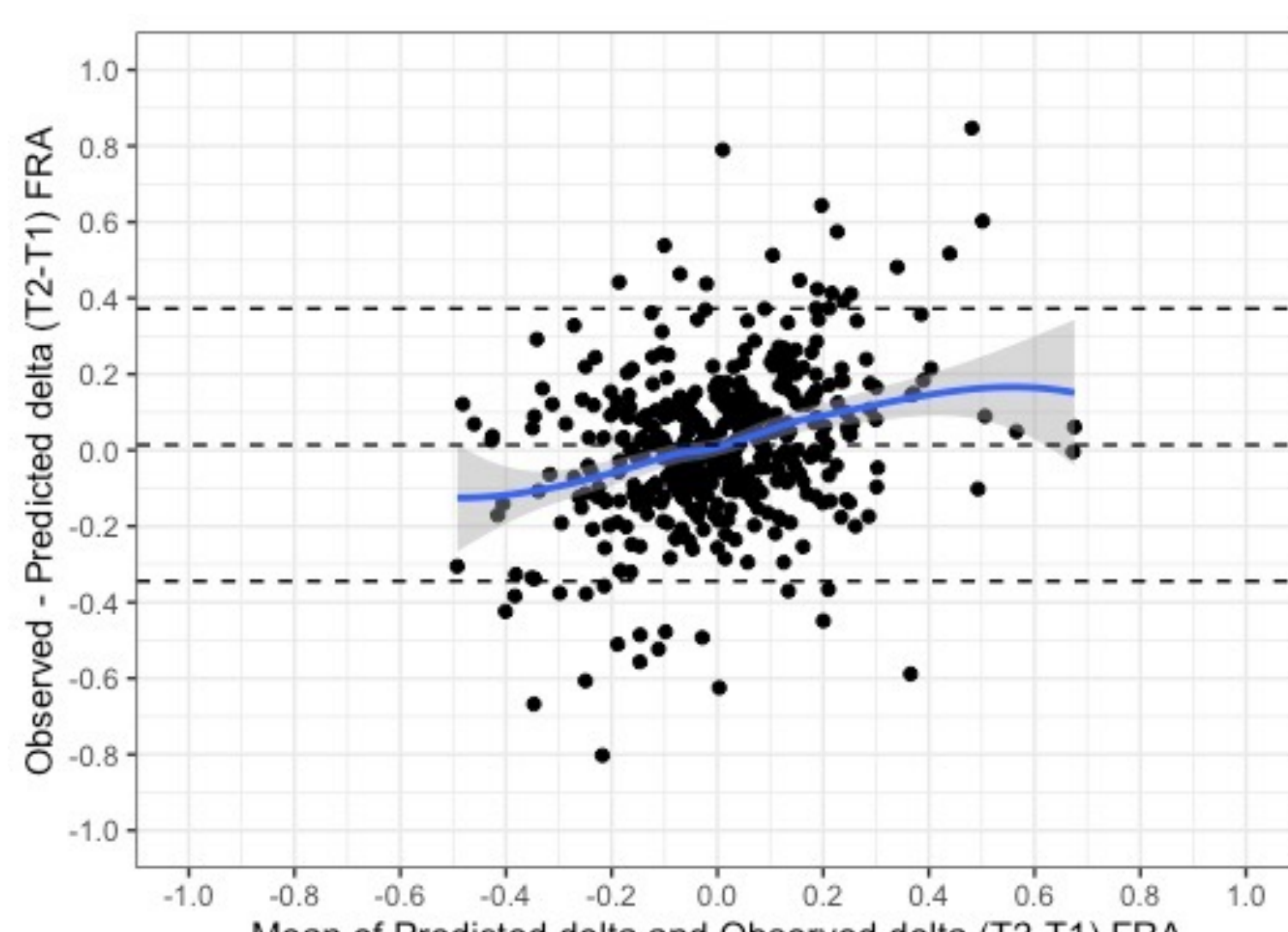
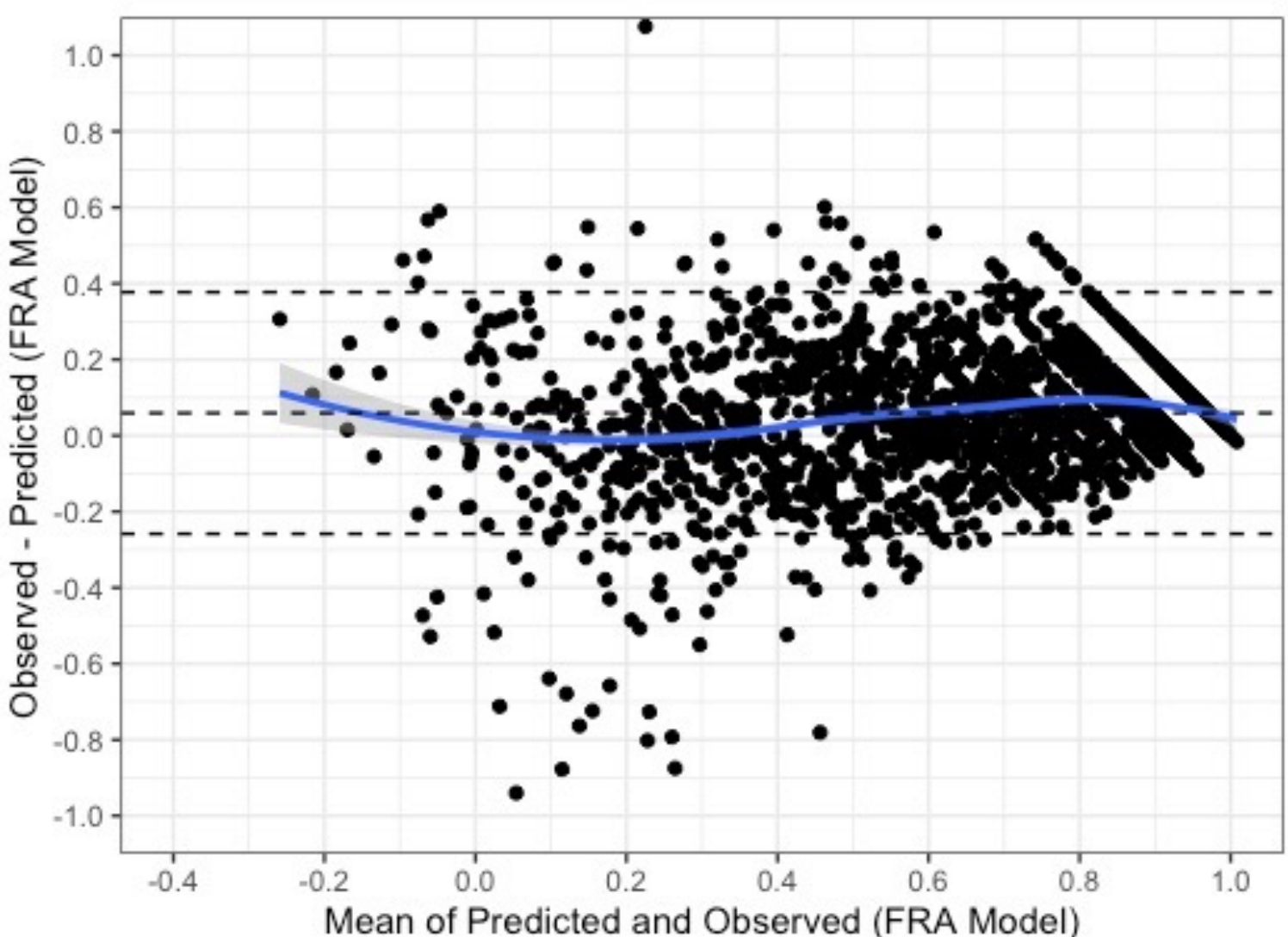
|                |       |
|----------------|-------|
| Bias           | 0.005 |
| nRMSE          | 0.108 |
| nMAE           | 0.074 |
| ICC            | 0.43  |
| R <sup>2</sup> | 0.22  |

|                |       |
|----------------|-------|
| Bias           | -0.10 |
| nRMSE          | 0.101 |
| nMAE           | 0.079 |
| ICC            | 0.77  |
| R <sup>2</sup> | 0.73  |



|                |       |
|----------------|-------|
| Bias           | 0.013 |
| nRMSE          | 0.101 |
| nMAE           | 0.072 |
| ICC            | 0.47  |
| R <sup>2</sup> | 0.26  |

|                |       |
|----------------|-------|
| Bias           | 0.06  |
| nRMSE          | 0.113 |
| nMAE           | 0.084 |
| ICC            | 0.81  |
| R <sup>2</sup> | 0.69  |



|                |       |
|----------------|-------|
| Bias           | 0.014 |
| nRMSE          | 0.120 |
| nMAE           | 0.082 |
| ICC            | 0.50  |
| R <sup>2</sup> | 0.27  |

Conclusion

- All models show similar prediction performance at baseline: lower values are over- and higher values underestimated
  - All models perform similarly worse in predicting changes in EQ-5D as low accuracy and agreement of two predicted values accumulate
  - Higher order coefficients (Germany, France, UK models) improve prediction performance only in baseline comparisons