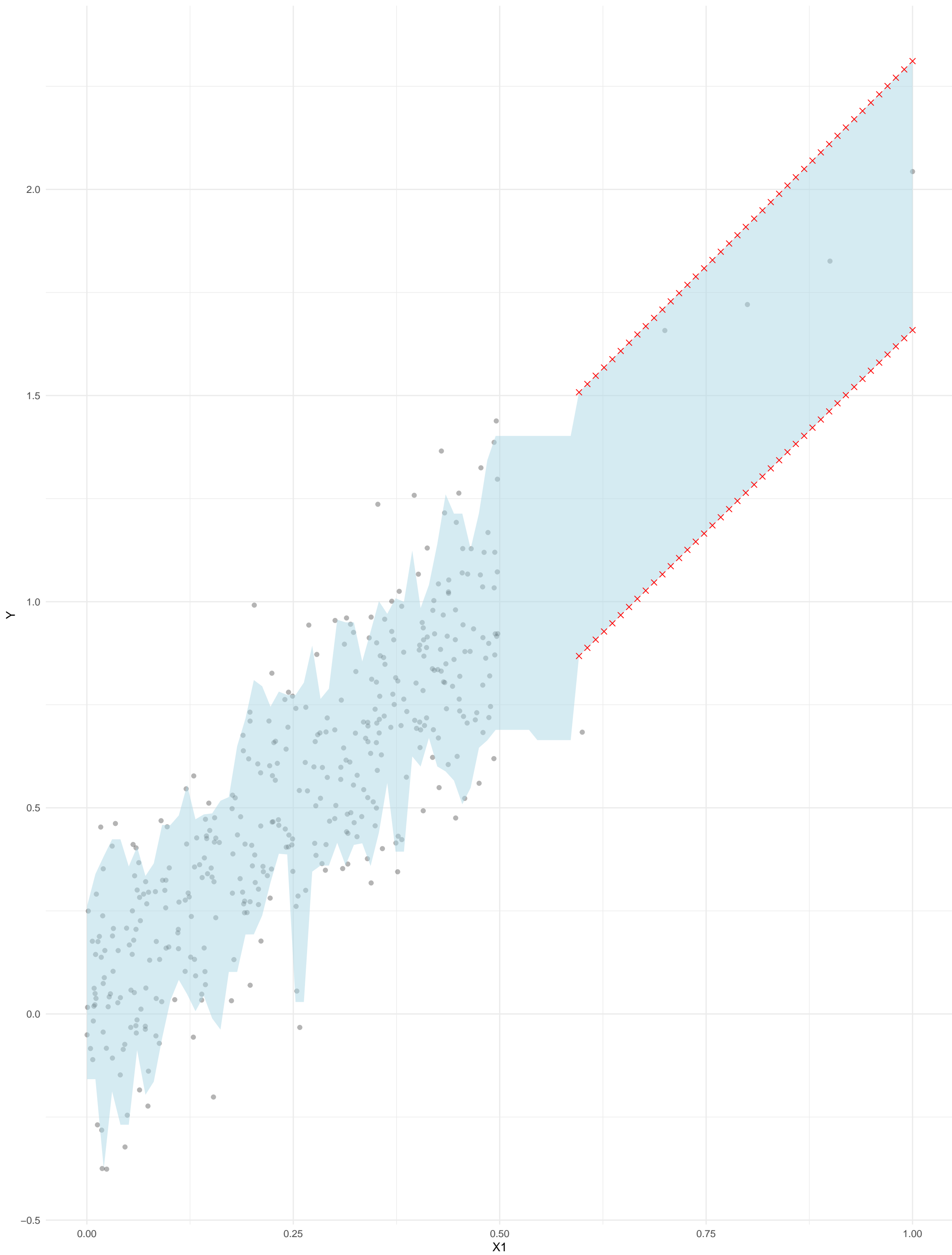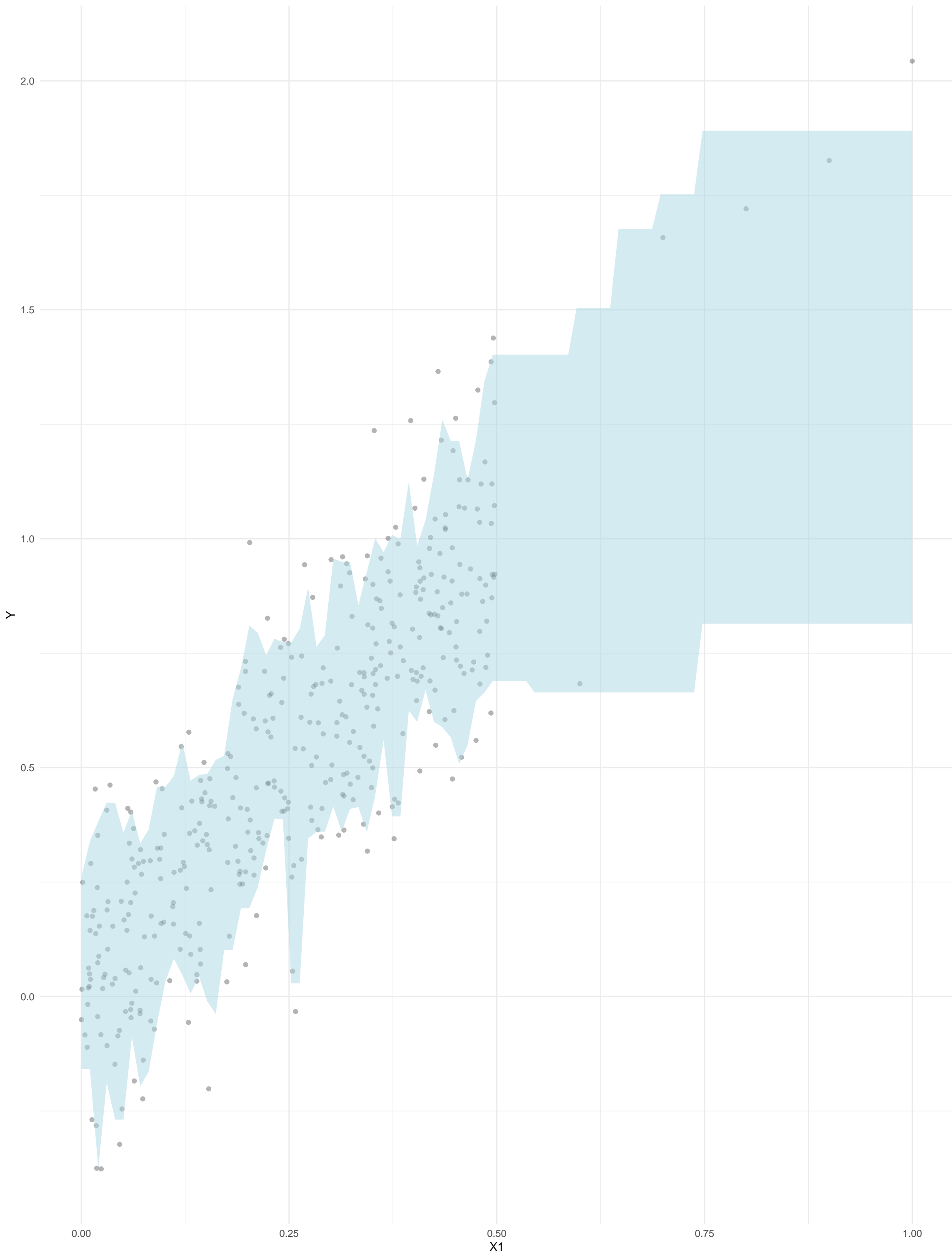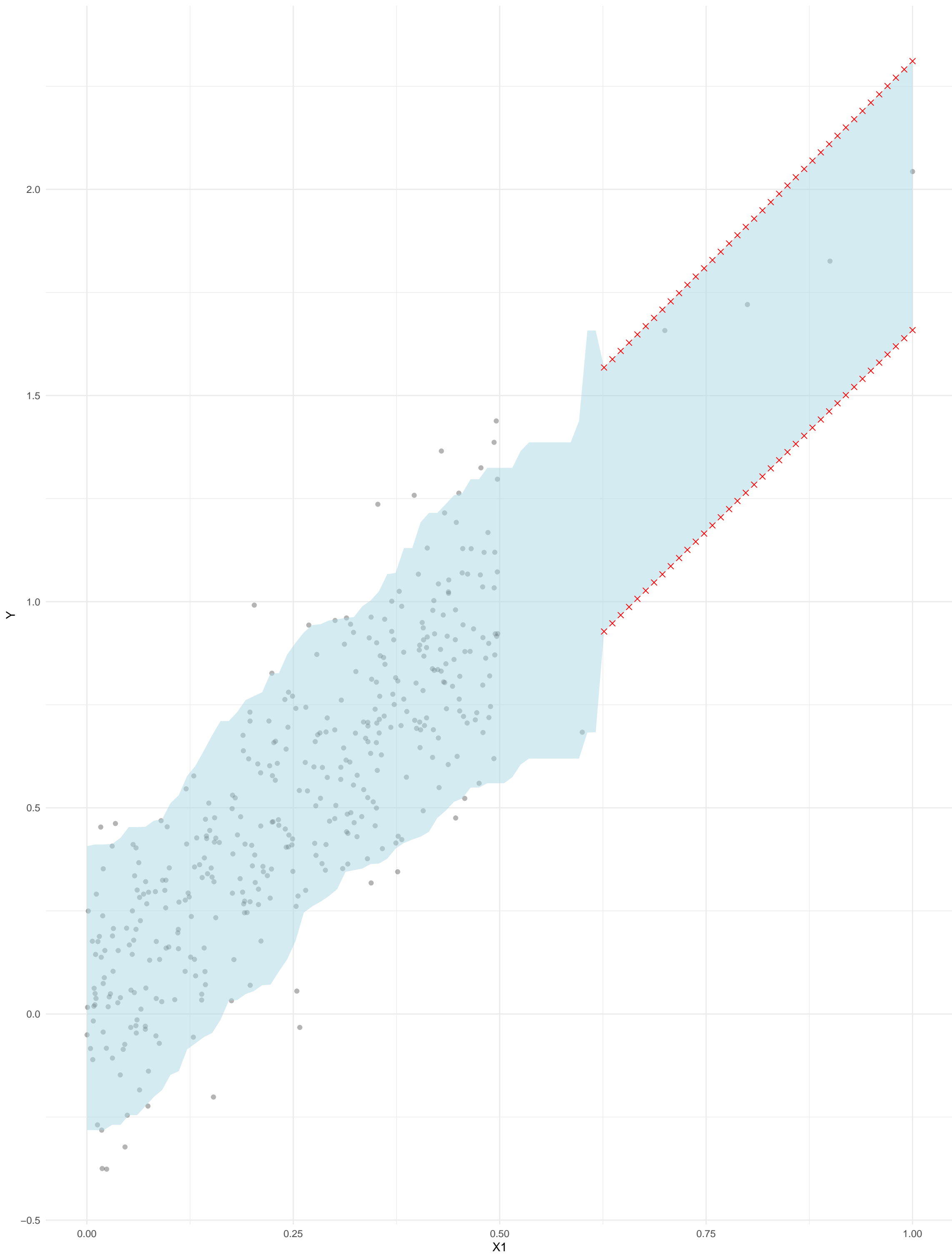Prediction Intervals (Method: knn_eqt)

Prediction Intervals (Method: knn_eqt)

Prediction Intervals (Method: kde_eqt)

Prediction Intervals (Method: kde_eqt)

SCENARIO A: LINEAR DATA (kNN vs KDE)

A1: Robust kNN (Linear Fallback)
Trigger: Distance > 0.1

A2: Naive kNN (No Fallback)
Fails: Contaminated neighbors

A3: Robust KDE (Linear Fallback)
Trigger: Effective Sample Size < 5

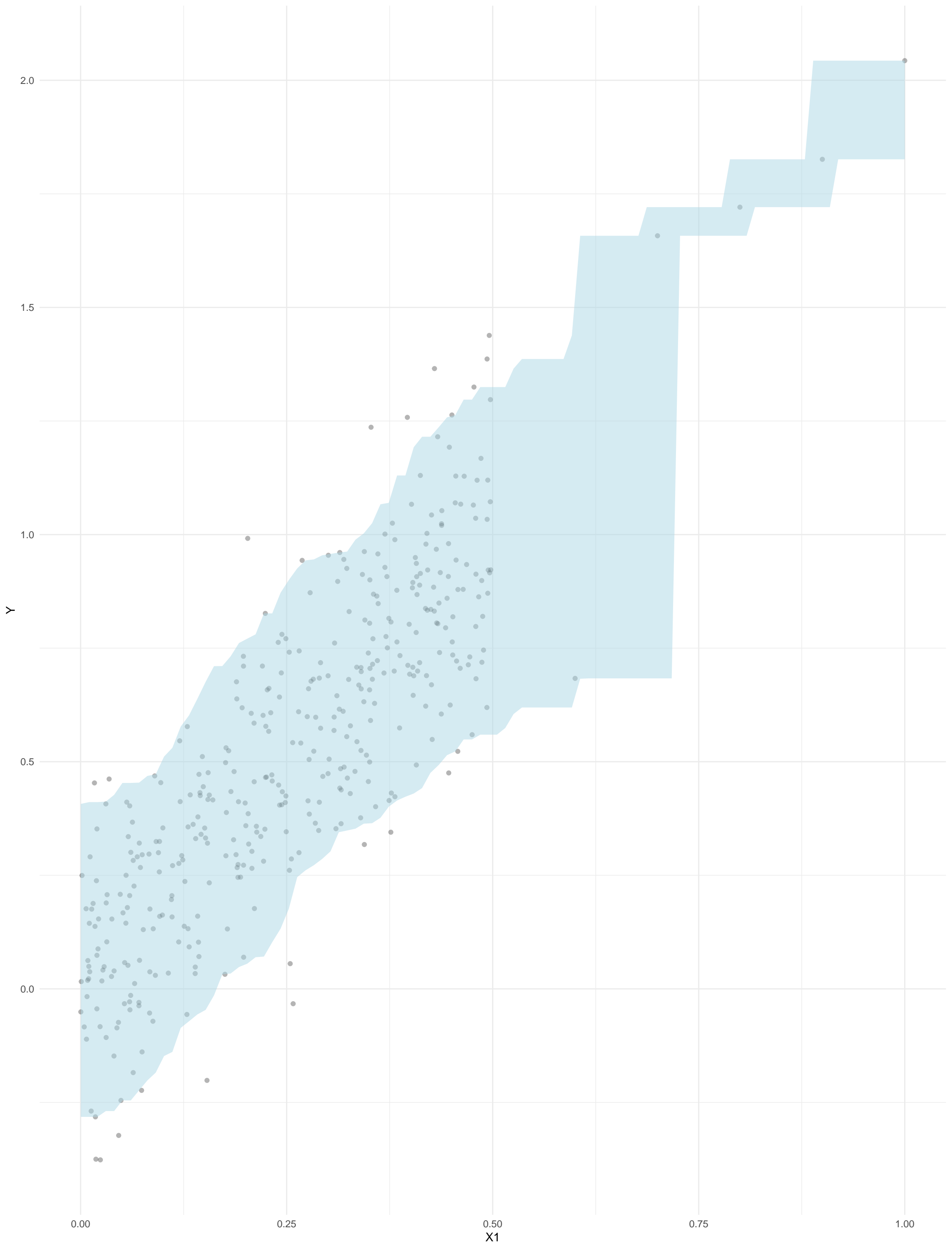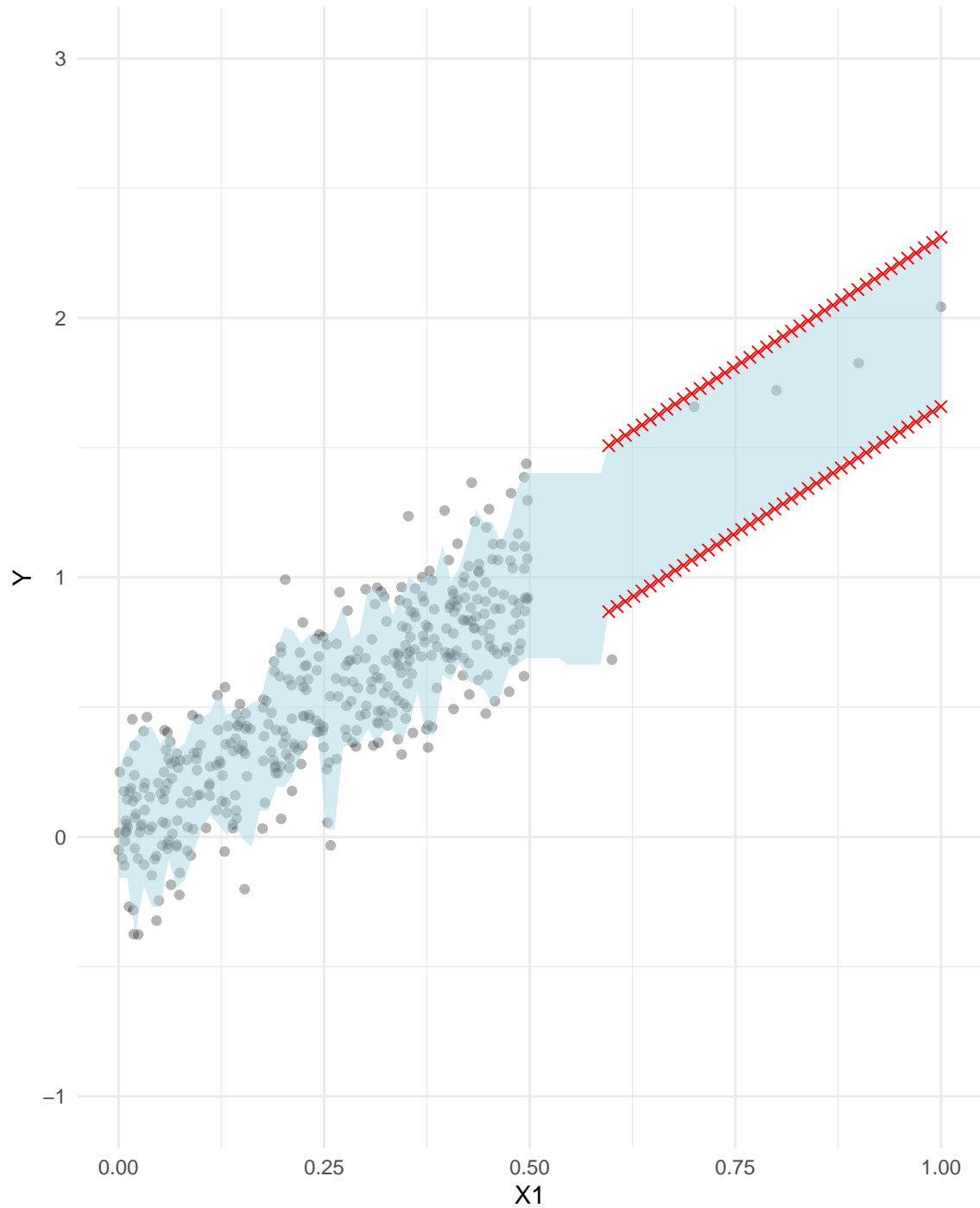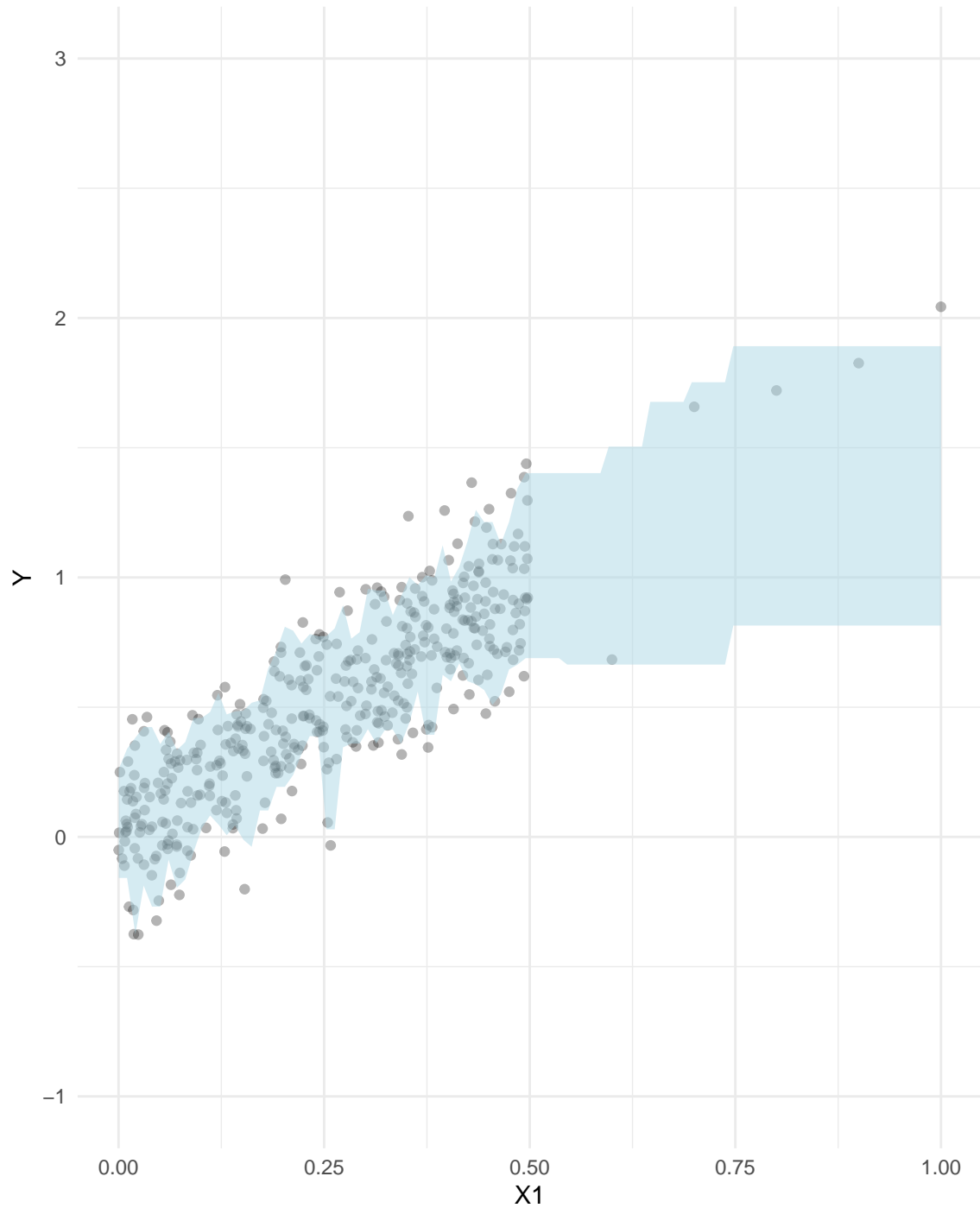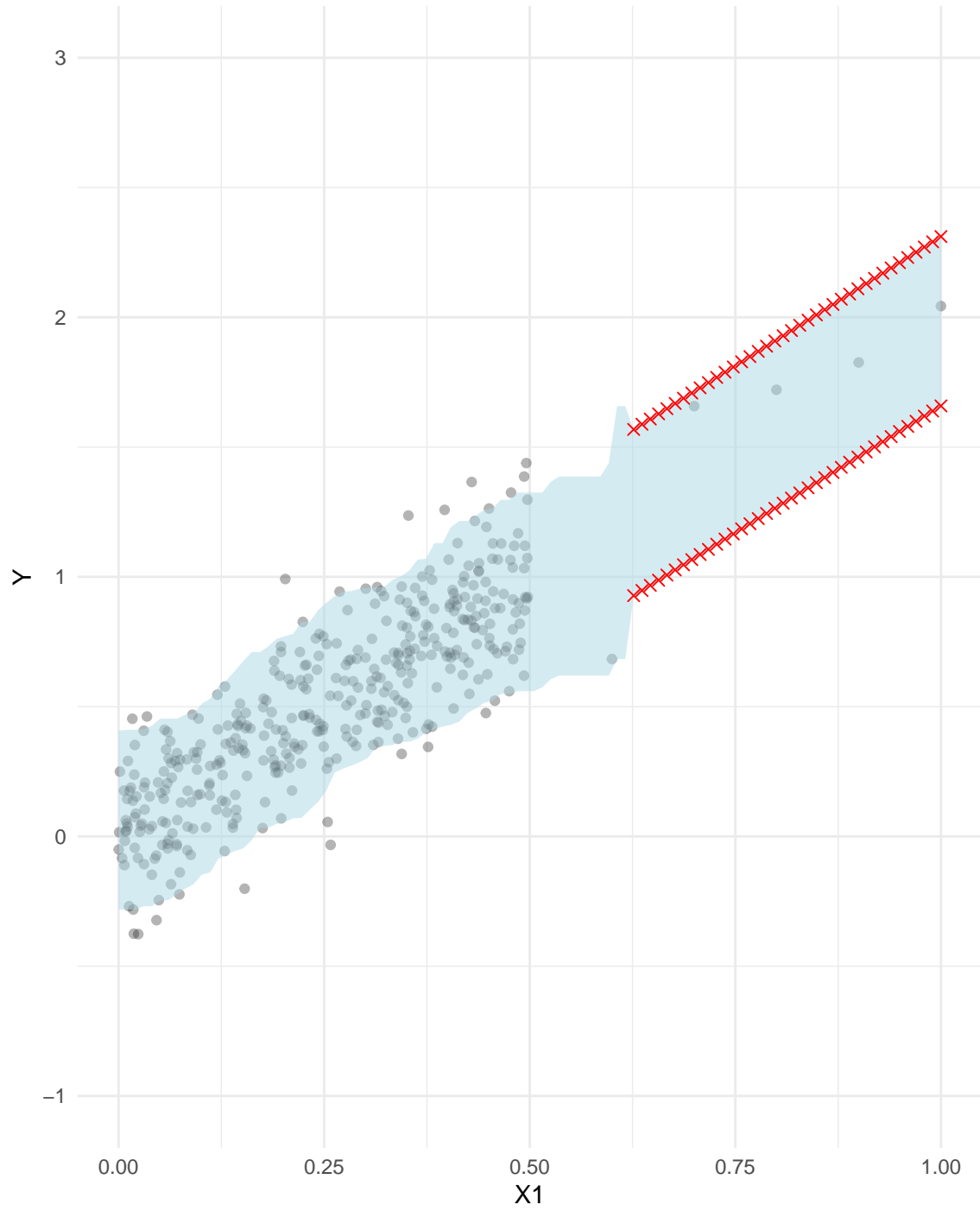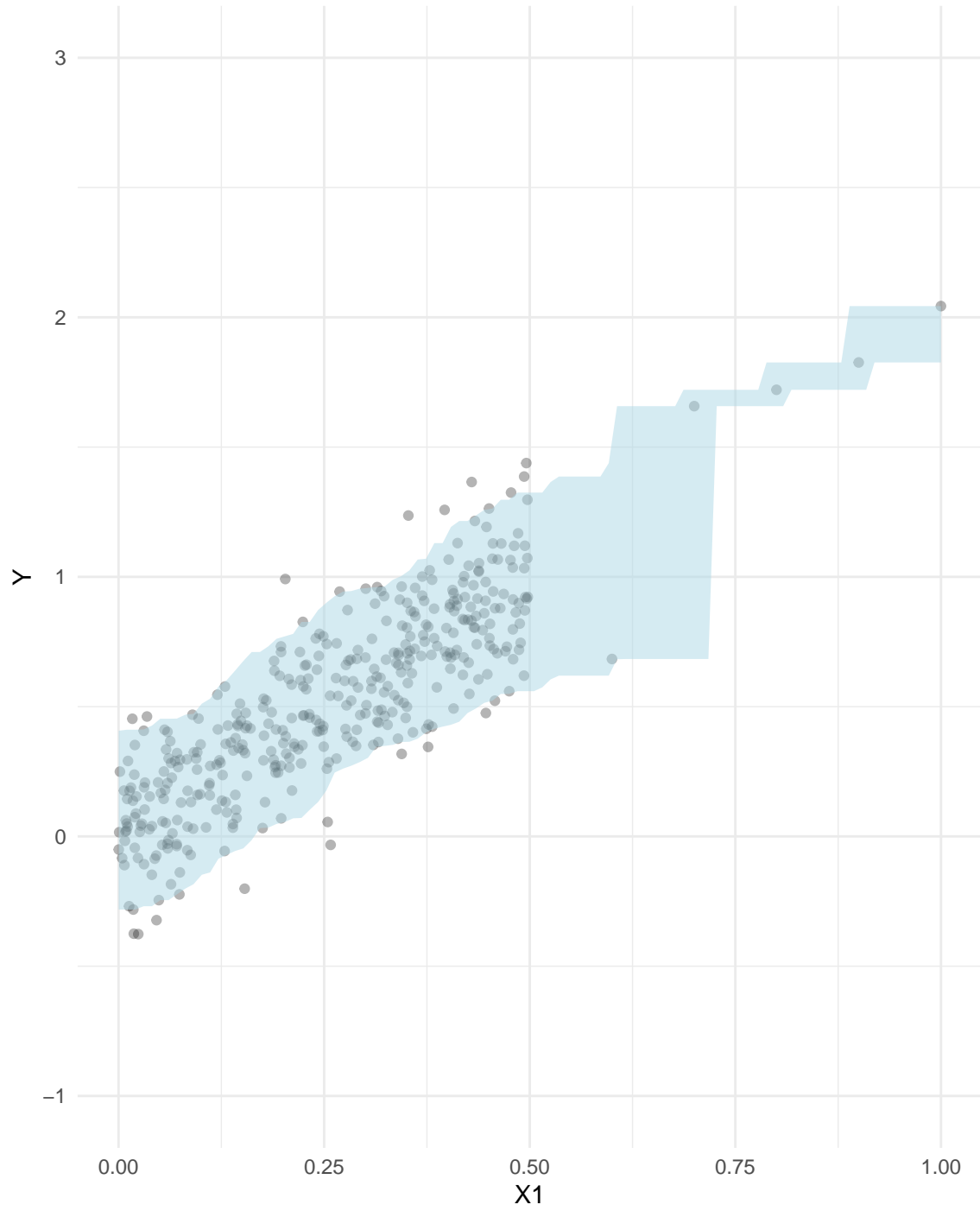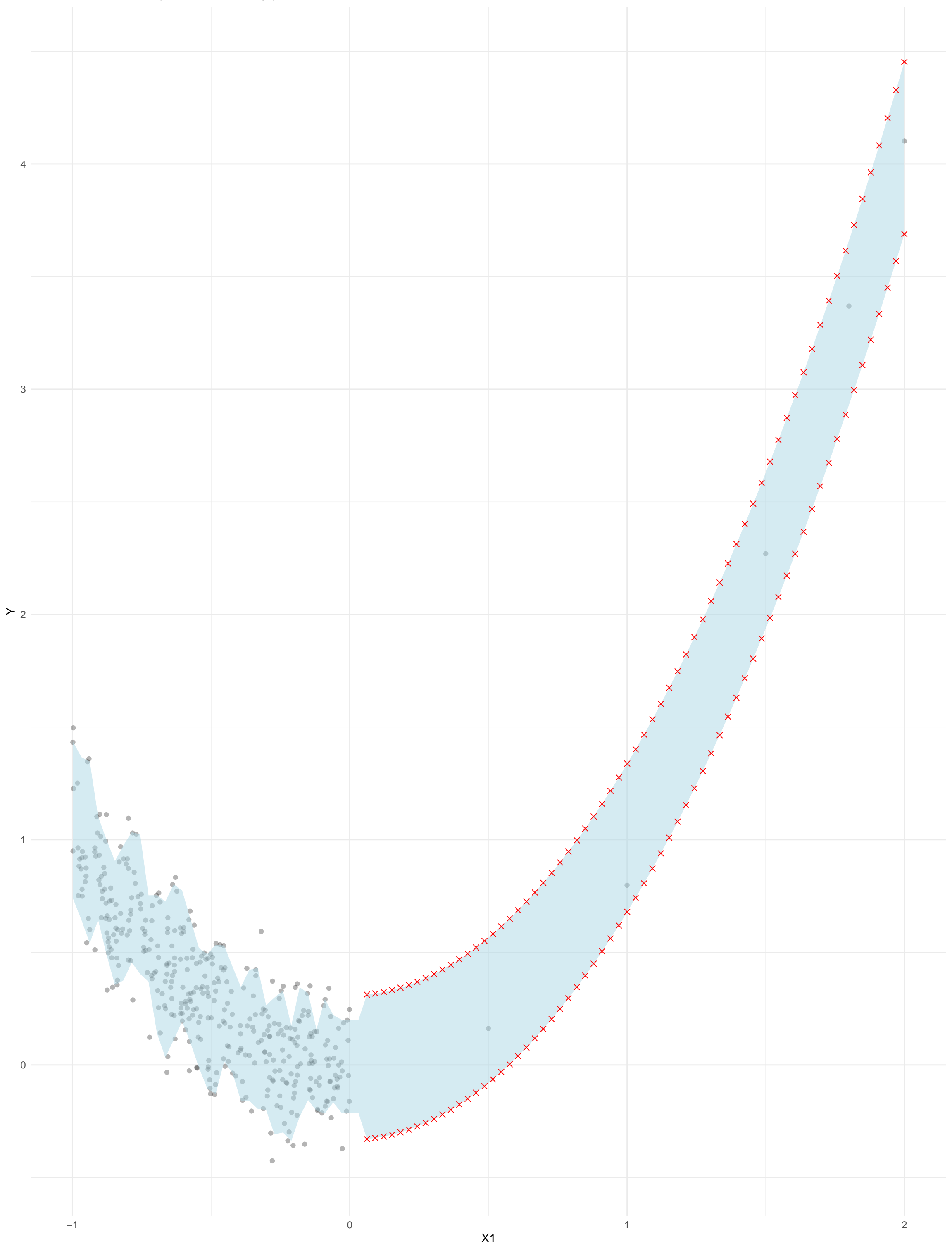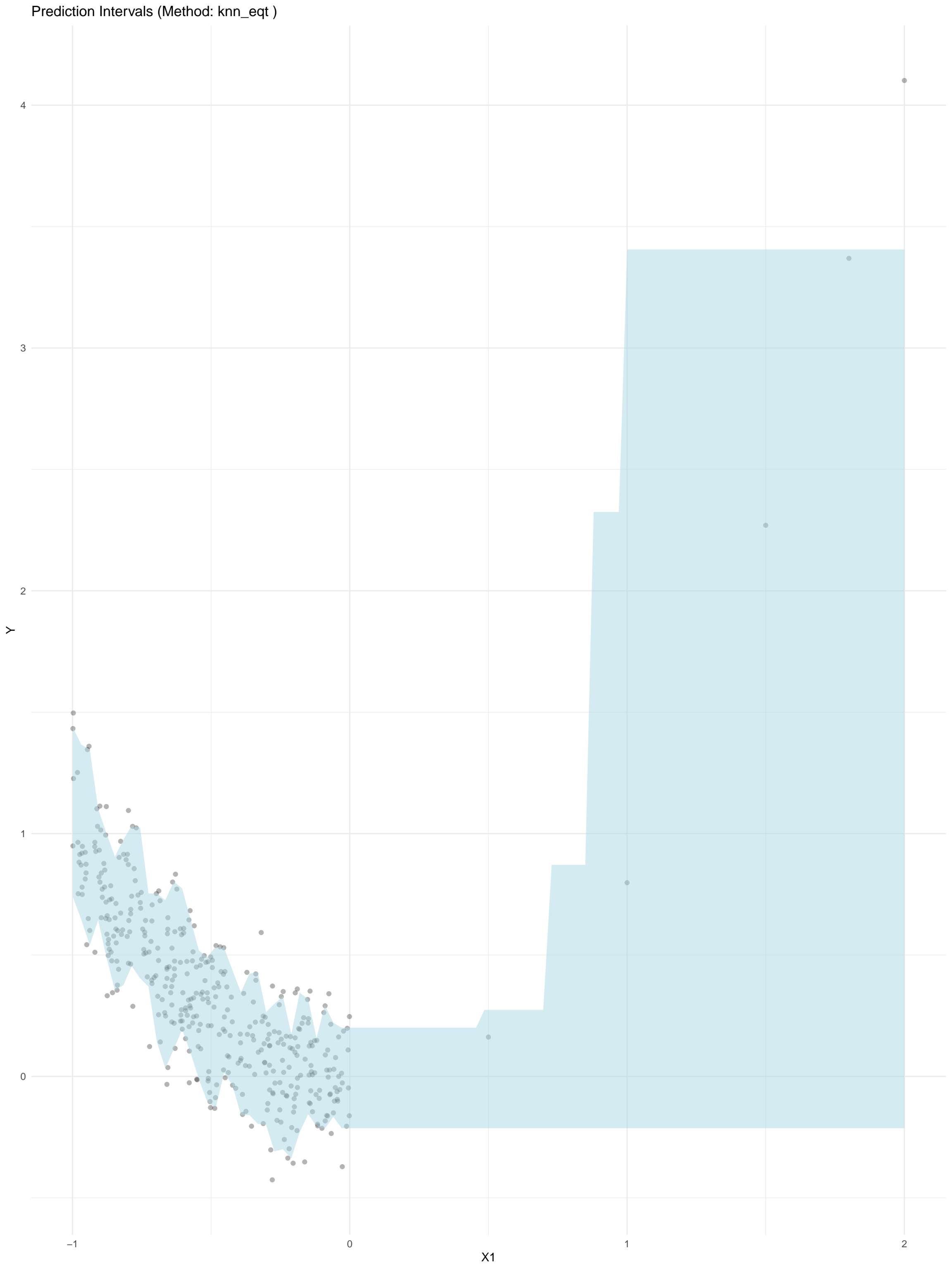**A4: Naive KDE (No Fallback)**
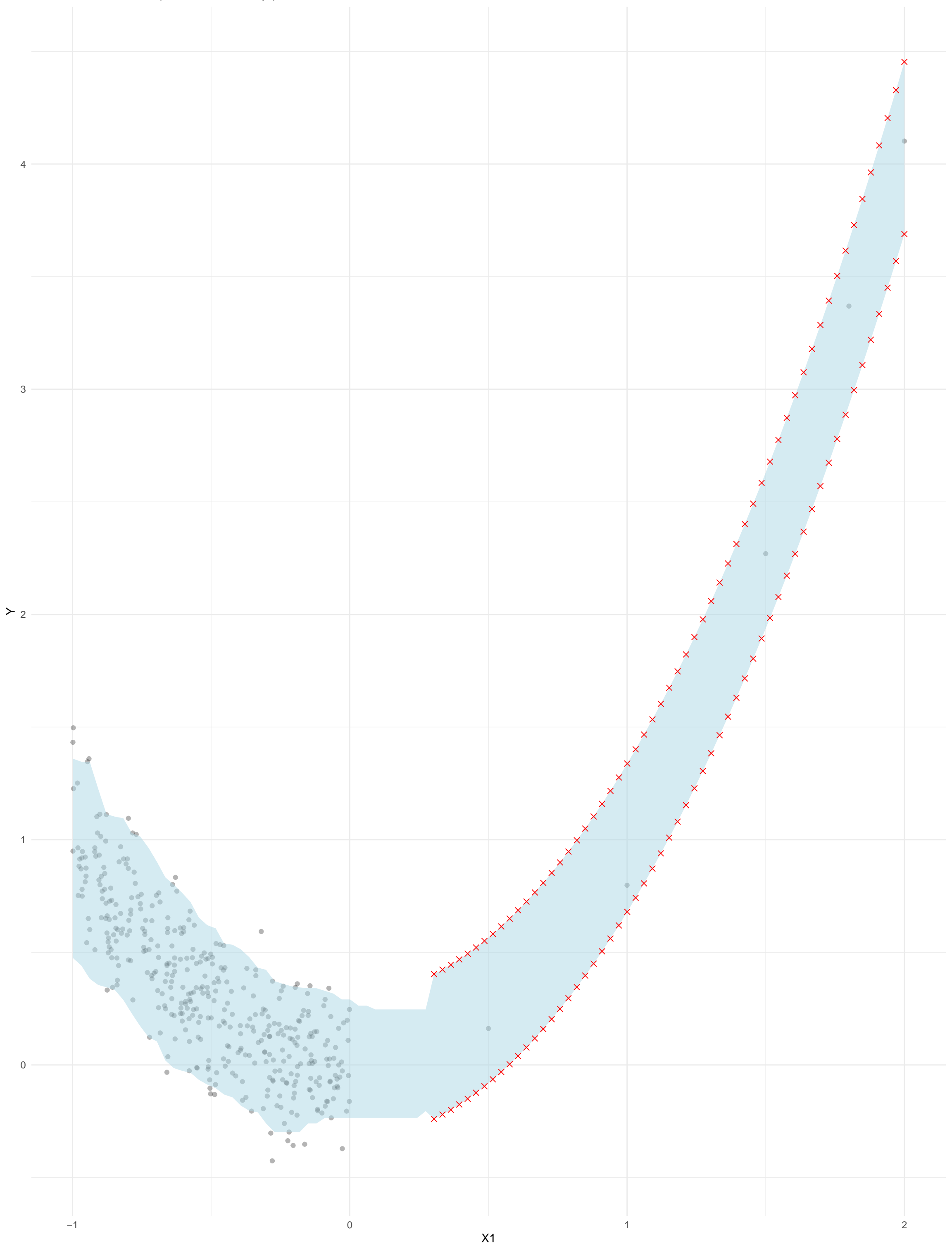Fails: Unstable density estimate in gap
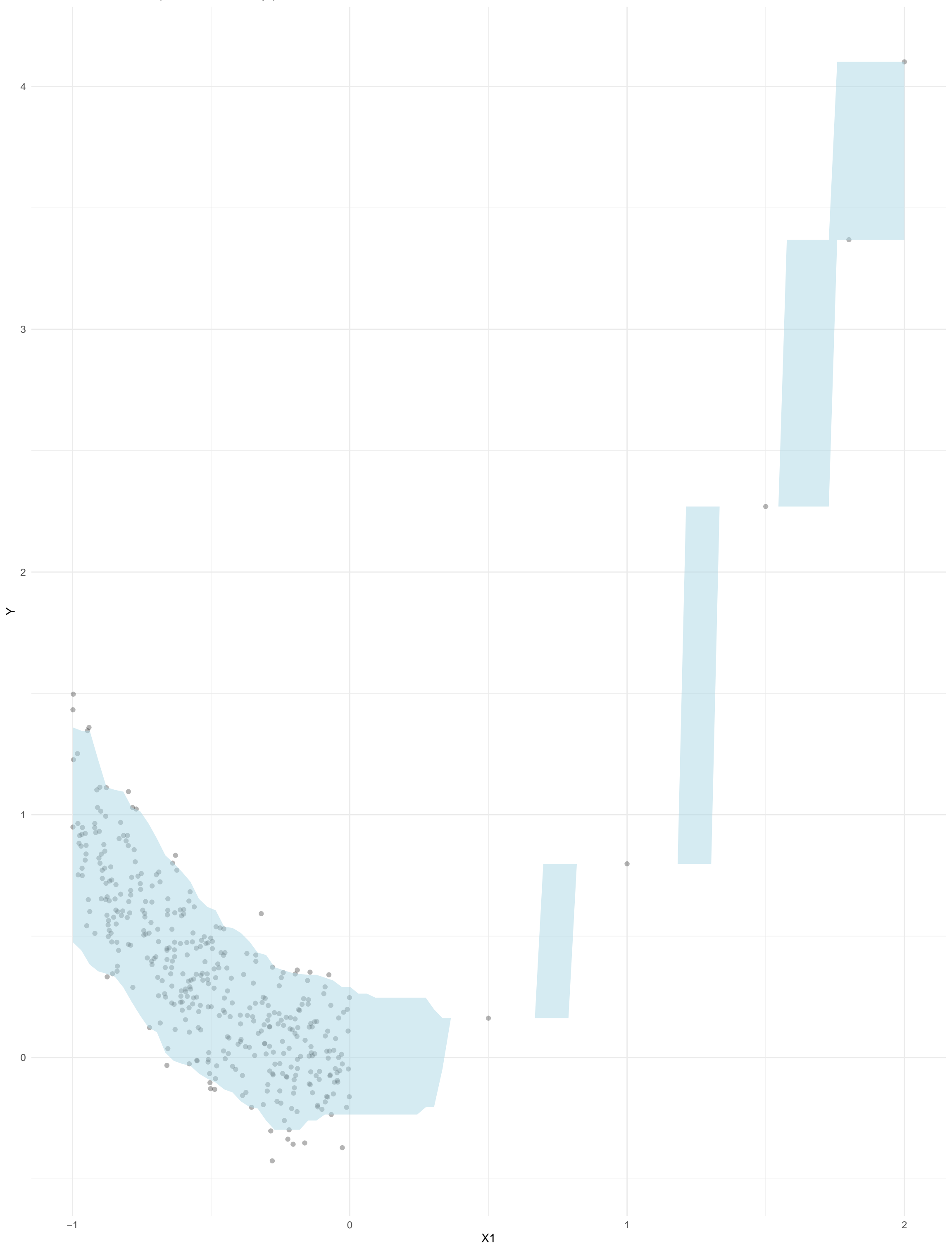
Prediction Intervals (Method: knn_eqt)

Prediction Intervals (Method: knn_eqt)
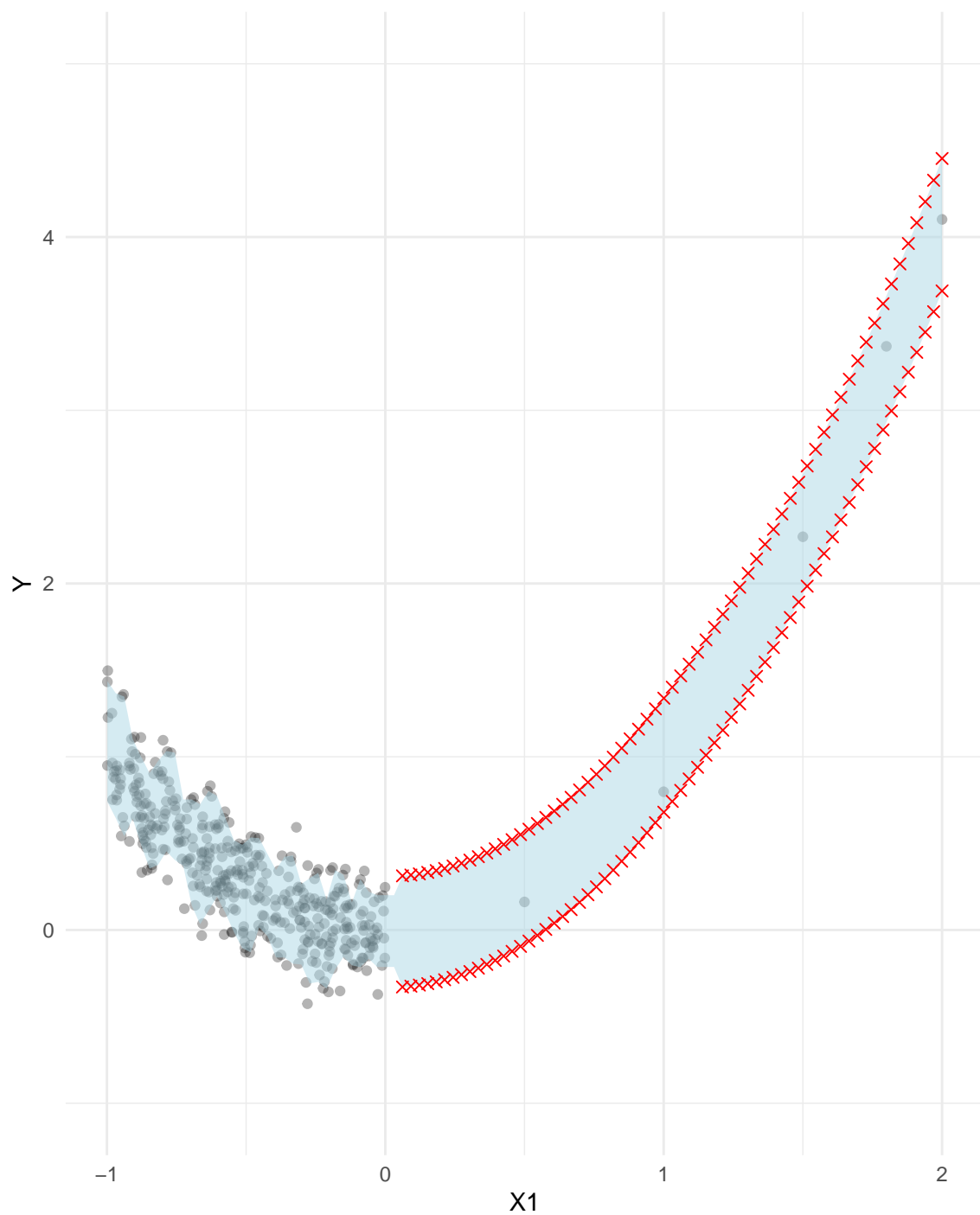
Prediction Intervals (Method: kde_eqt)

Prediction Intervals (Method: kde_eqt)

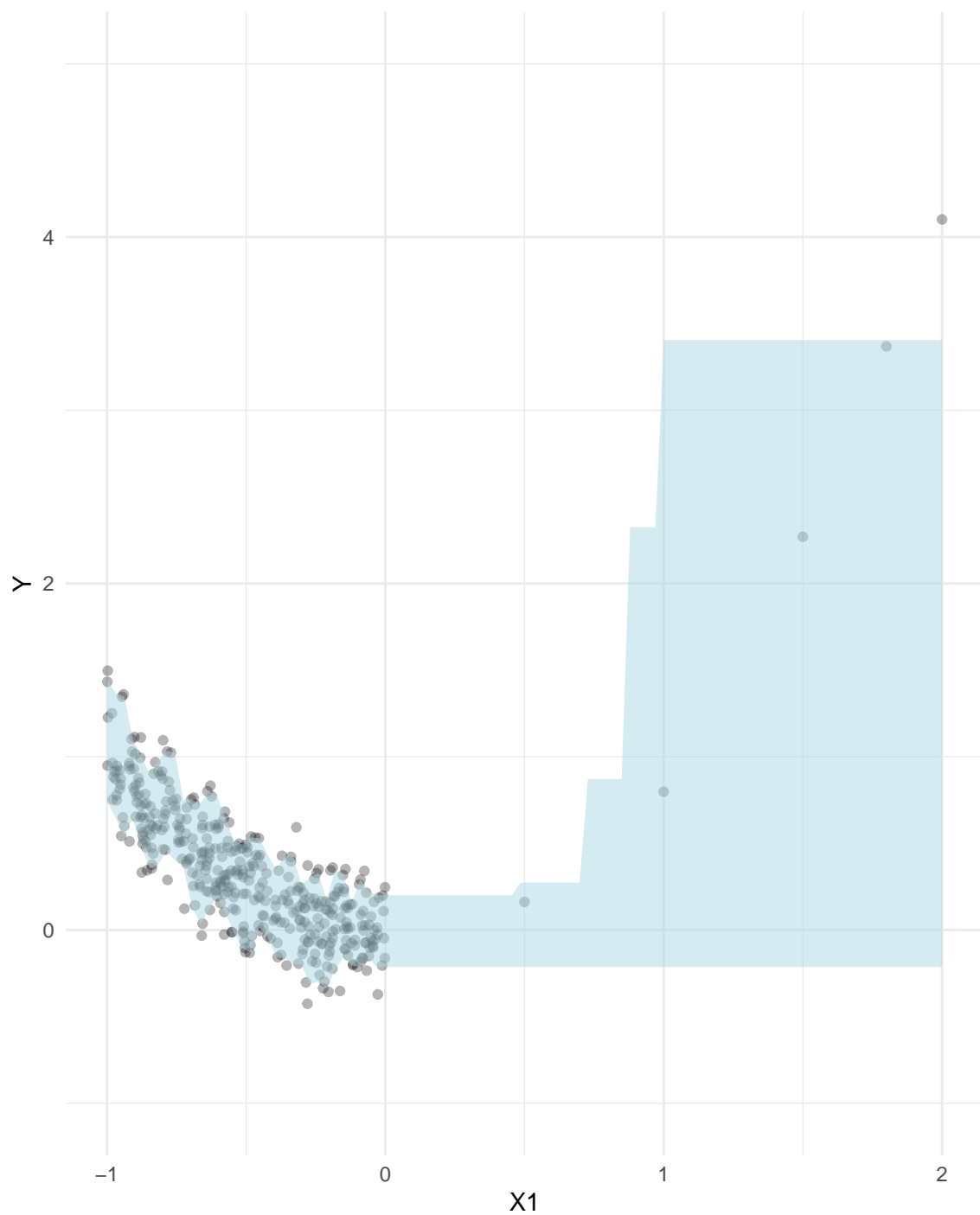# SCENARIO B: NON−LINEAR DATA (kNN vs KDE)

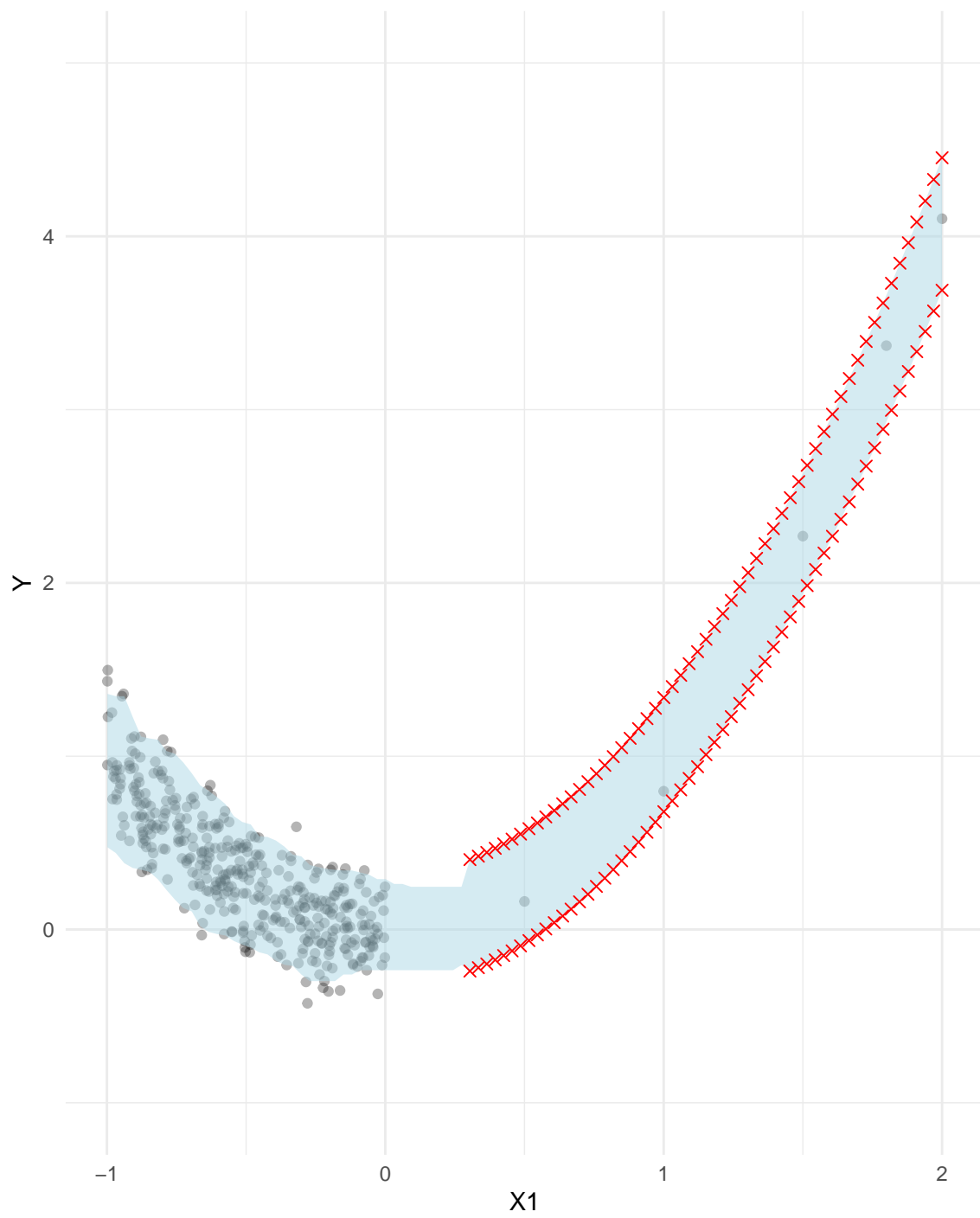## B1: Robust kNN (Quadratic Fallback)
Extrapolates curve correctly (*)

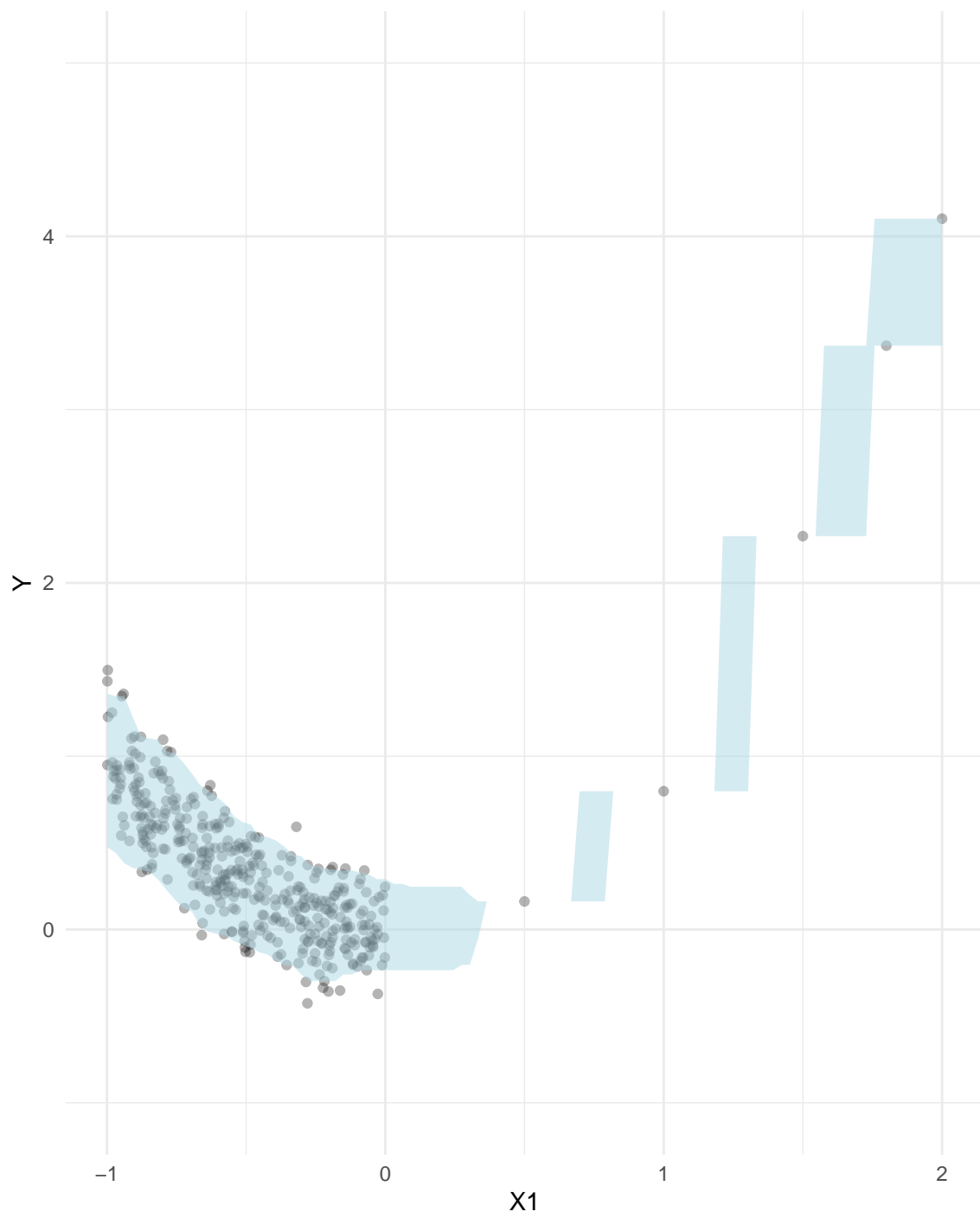## B2: Naive kNN (No Fallback)
Fails to extrapolate trend

B3: Robust KDE (Quadratic Fallback)
Extrapolates curve correctly (*)

B4: Naive KDE (No Fallback)
Unstable/Wide in sparse region

Part 3: Quantitative Metrics (Compare Winkler Scores)

	Coverage	Avg_Width	Winkler_Score	Target_Alpha
kNN Robust (Quad)	0.82	0.631	0.961	0.1
KDE Robust (Quad)	0.85	0.676	0.902	0.1
kNN Naive	0.76	1.676	2.764	0.1