Supplemental Figures

Impact of Case-Mix Measurement Error on Estimation and Inference in Profiling of Health Care Providers

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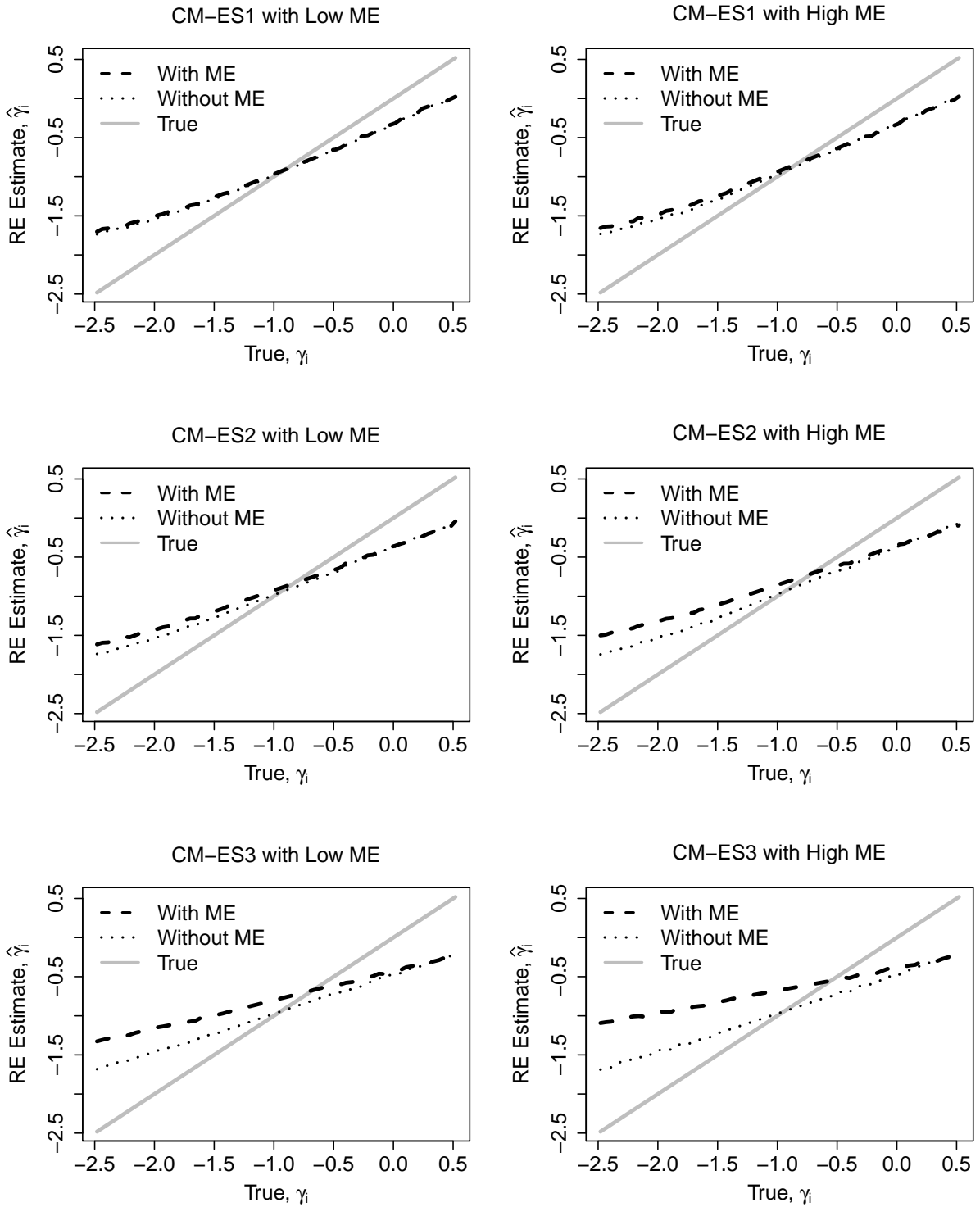[*]*email:* danhvn1@uci.edu

Figure S1: Bias of provider-specific estimates ($\widehat{\gamma}_i$) of random effects (RE) models as a function of case-mix effect size (CM-ES 1 to CM-ES 3 corresponding to $\beta_z = \beta_x = 0.5$, 1, and 2) and the level of measurement error (ME: low or high ME).
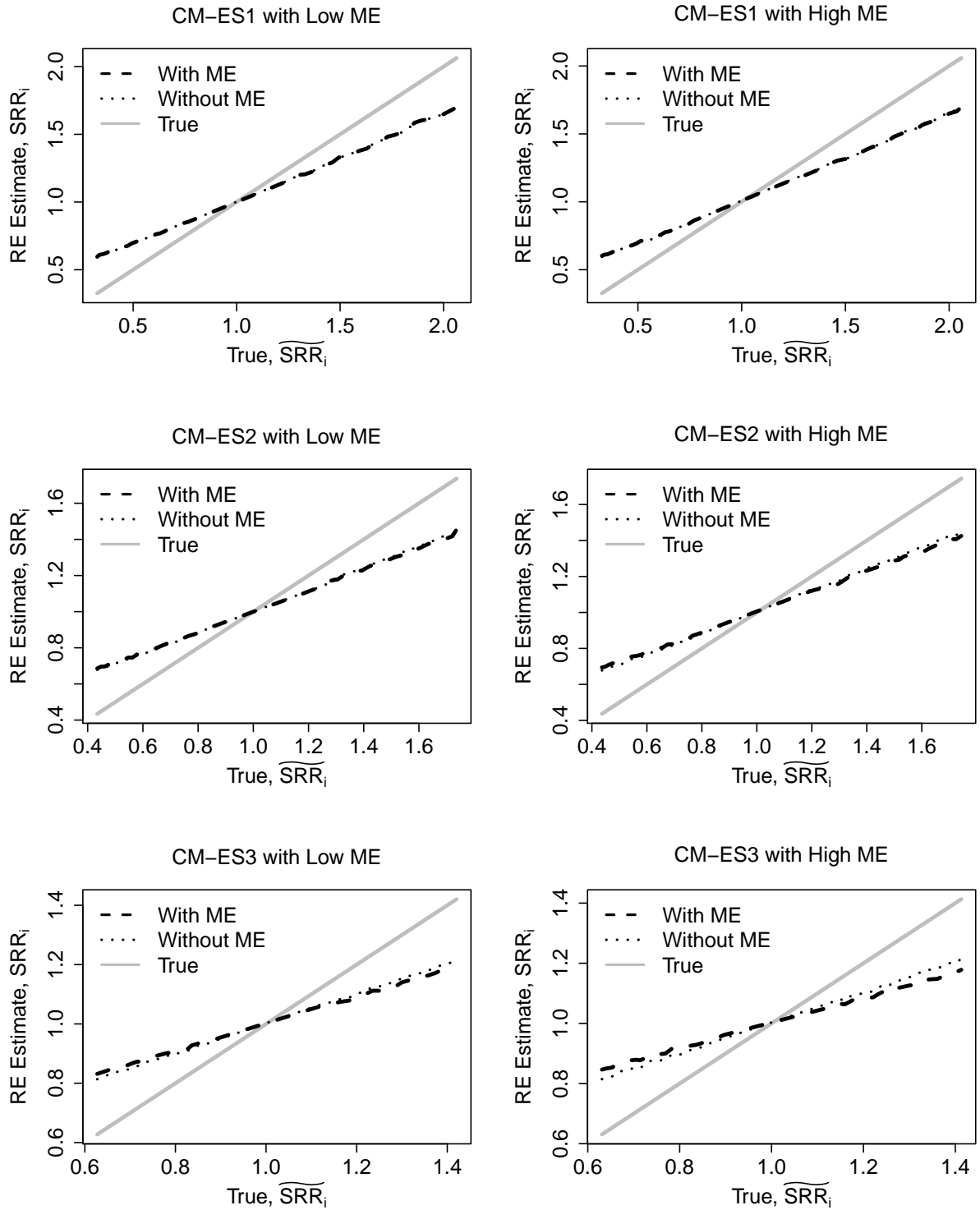
Figure S2: Provider-effect estimates, SRR_i, for random effects (RE) models with and without measurement error (ME: column 1 - low ME, column - high ME) and across case-mix effect sizes (CM-ES).
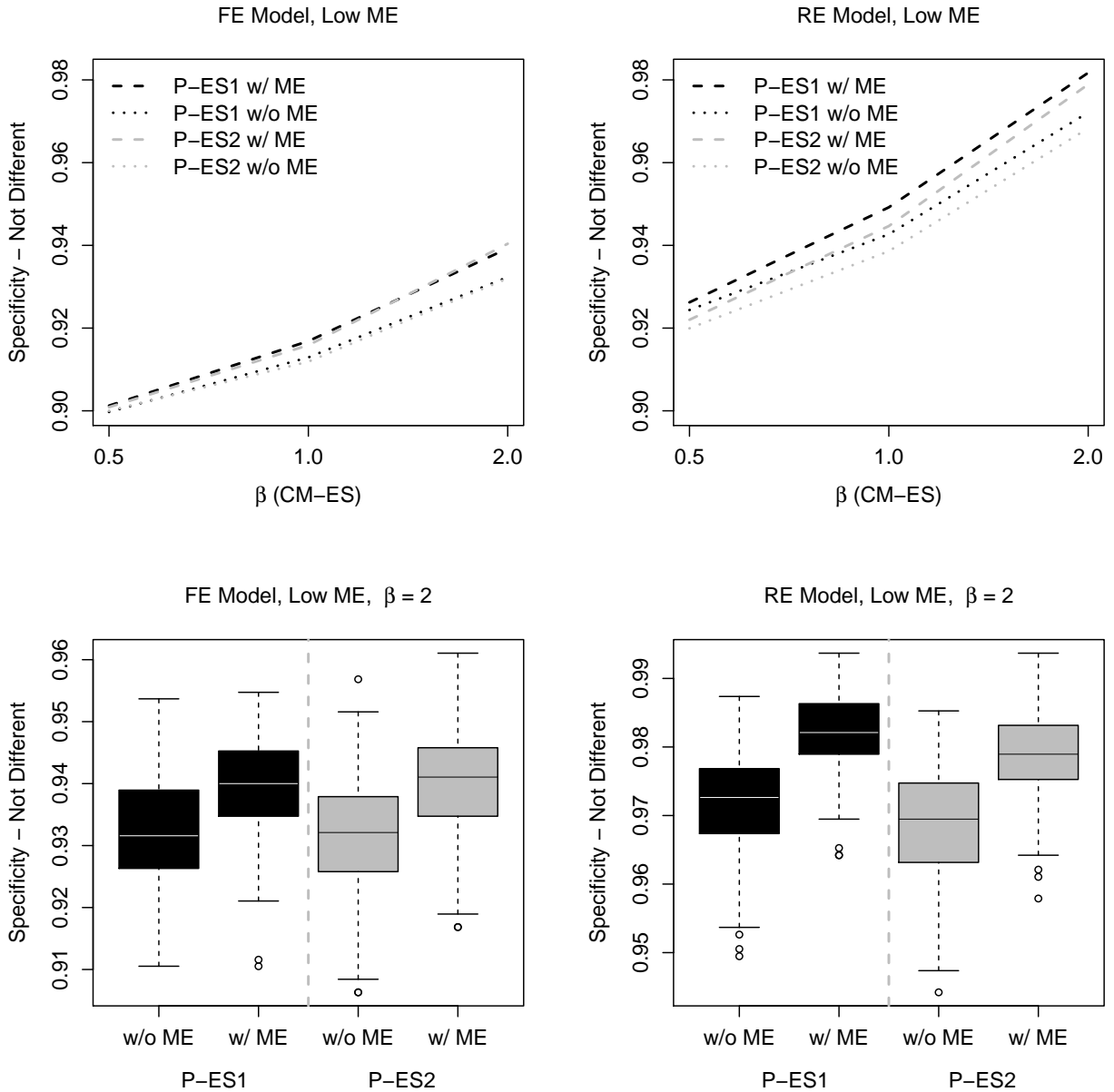
Figure S3: Row 1: Overall average flagging performance/specificity for identifying providers with standardized readmission rate not different from the reference as a function of case-mix effect size (CM-ES 1 to 3: $\beta = 0.5, 1, 2$), averaged over 200 simulated datasets. Given are results for fixed effects (FE) and random effects (RE) models when patient case-mix variables are ascertained without measure error (w/o ME; dotted), with ME (w/ ME; dashed), and for provider effect sizes (P-ES1, P-ES2: low, high). Row 2: Distribution of specificity for identifying truly under-performing providers for the case of $\beta = 2$.
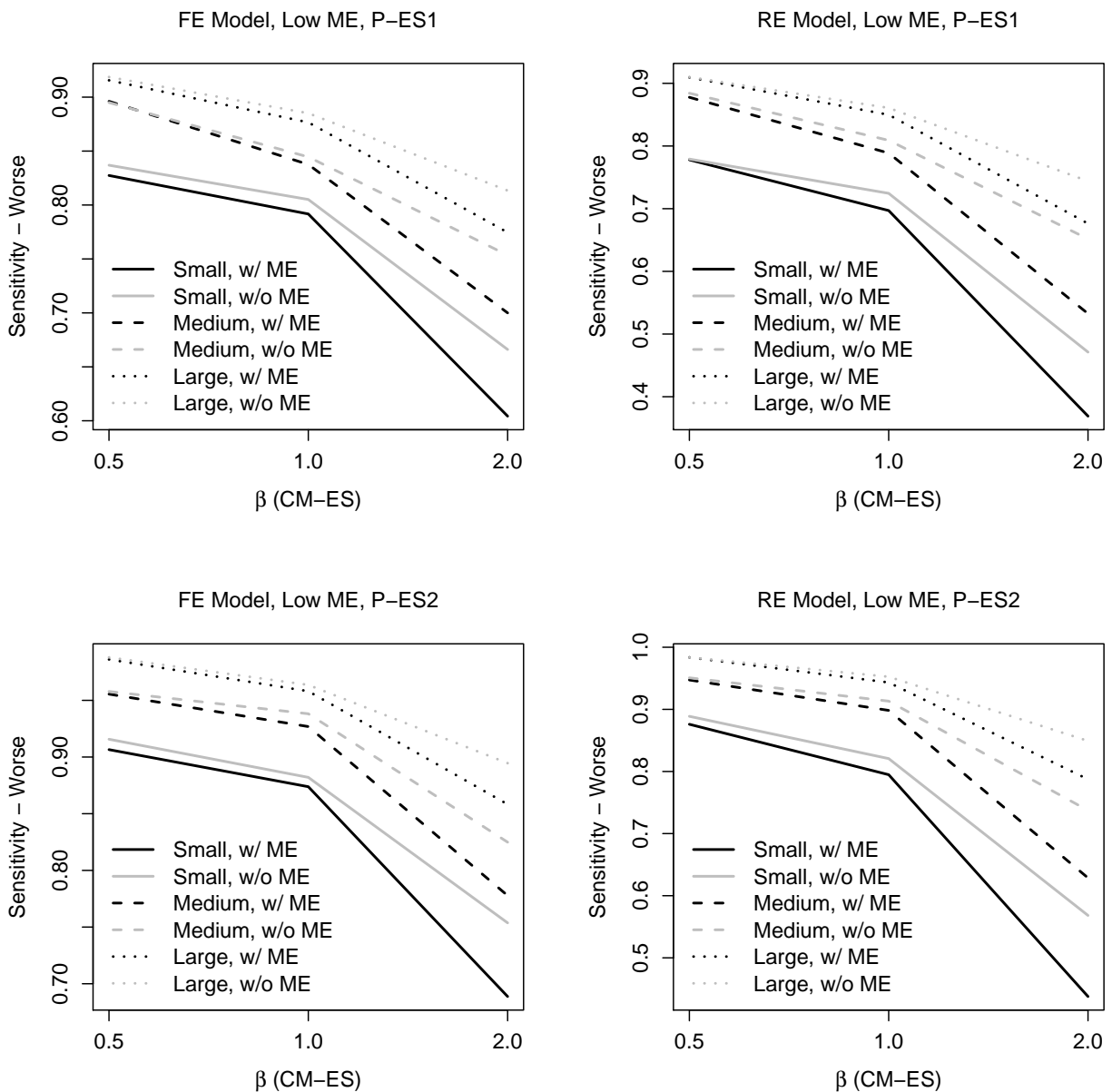
Figure S4: Average flagging performance/sensitivity as a function of case-mix effect size (CM-ES 1 to 3: $\beta = 0.5, 1, 2$), averaged over 200 simulated datasets, for small, medium, large provider volume. Given are results for fixed effects (FE) and random effects (RE) models when patient case-mix variables are ascertained without measure error (ME) and with ME under low (P-ES1) provider effect size.
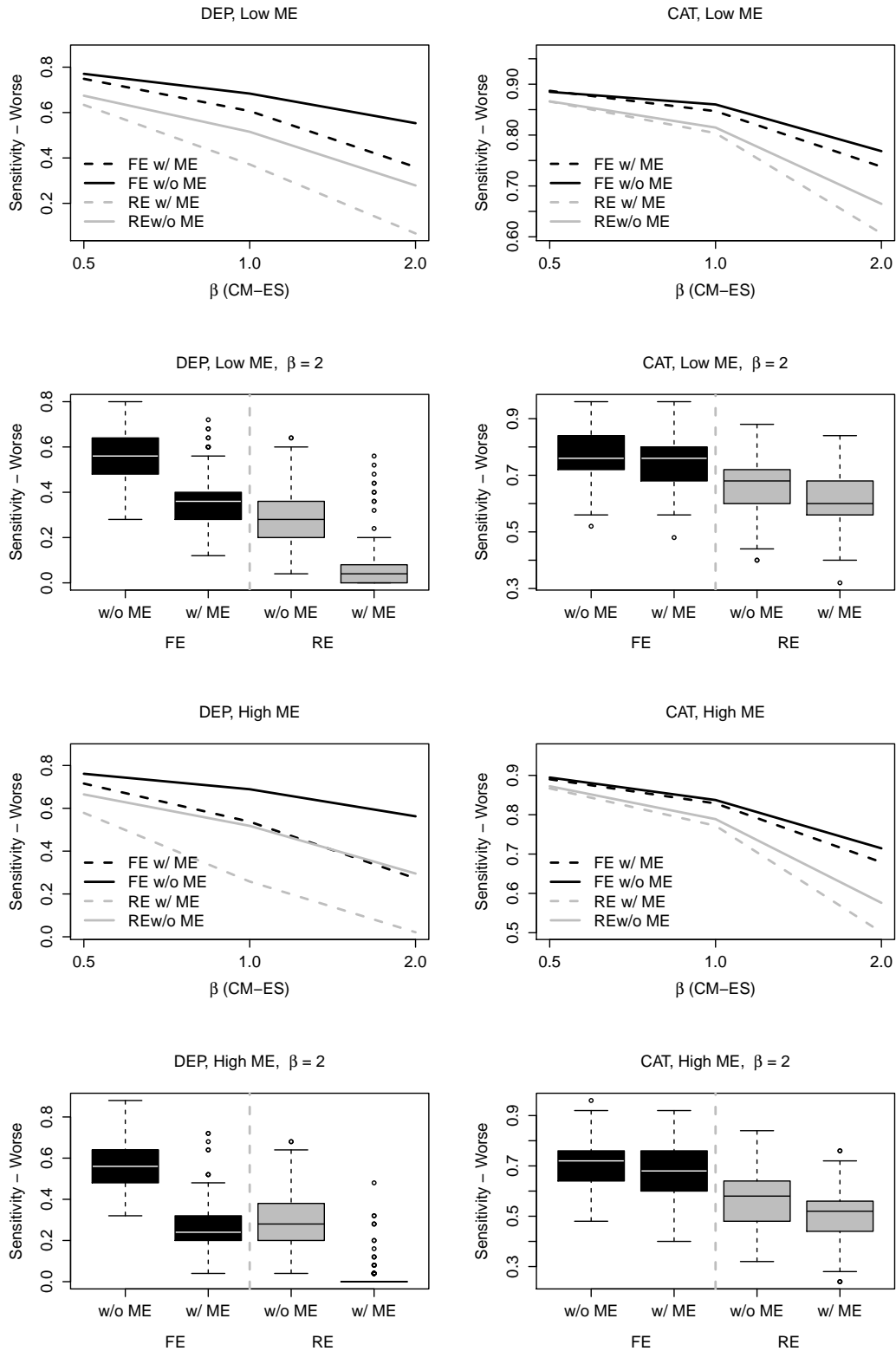
Figure S5: Performance of fixed effects (FE) and random effects (RE) models under more general dependence (DEP)/correlation structure (column 1) and categorical (CAT) case-mix variables (column 2) across case-mix effect sizes (CM-ES) and low/high measurement error (ME). Given are results for low provider effect size (P-ES1).