Supplementary Material to
Landmarking 2.0: Bridging the gap between joint models and landmarking

Hein Putter, Hans C. van Houwelingen

December 30, 2021

| Model                  | Time (seconds) |
|------------------------|---------------|
| Landmarking            | 0.08          |
| Landmarking 1.5        | 15.4          |
| Landmarking 2.0        | 166           |
| Joint model            | 2975          |

Table S1: Average computation time per replication in the base scenario; model fitting on training data with $n = 500$ and calculating prediction probabilities for six combinations of landmark time $s$ and prediction horizon $t$ for all subjects in the landmark data sets (approximately $N = 5000$ for first landmark time, $N = 3750$ for second landmark time and $N = 2500$ for third landmark time).
Figure S1: Marginal survival function of the event times in the base scenario.
Figure S2: Generated biomarker processes (solid lines, black before event, grey after event) and observed biomarker values (open circles); event (or censoring at $t = 10$) time is indicated by dashed vertical line.
Figure S3: Individual survival functions of the first four subjects in the validation set for the base scenario; biomarker processes in Figure S2.
Figure S4: Reduction in mean squared error (with respect to NULL) of predicted probabilities in the base scenario.
Figure S5: Mean squared error of predicted probabilities in the scenario with $n = 1000$. 
| Method | Percent_reduction |
|--------|-------------------|
|        | LM1.0 | LM1.5 | LM2.0 | JM    | LM1.0 | LM1.5 | LM2.0 | JM    | LM1.0 | LM1.5 | LM2.0 | JM    |
| 12     |       |       |       |       |       |       |       |       |       |       |       |       |
| 13     |       |       |       |       |       |       |       |       |       |       |       |       |
| 14     |       |       |       |       |       |       |       |       |       |       |       |       |
| 23     |       |       |       |       |       |       |       |       |       |       |       |       |
| 24     |       |       |       |       |       |       |       |       |       |       |       |       |
| 34     |       |       |       |       |       |       |       |       |       |       |       |       |

Figure S6: Reduction in mean squared error (with respect to NULL) of predicted probabilities in the scenario with $n = 1000$. 
Figure S7: Mean squared error of predicted probabilities in the scenario with $\rho = 0.5$. 
Figure S8: Reduction in mean squared error (with respect to NULL) of predicted probabilities in the scenario with $\rho = 0.5$. 
Figure S9: Mean squared error of predicted probabilities in the scenario with $\theta = 2$. 
Figure S10: Reduction in mean squared error (with respect to NULL) of predicted probabilities in the scenario with $\theta = 2$. 
Figure S11: Mean squared error of predicted probabilities in the scenario with $\sigma_{\text{tot}}^2 = 1.5$. 
Figure S12: Reduction in mean squared error (with respect to NULL) of predicted probabilities in the scenario with $\sigma_{\text{tot}}^2 = 1.5$. 
Figure S13: Mean squared error of predicted probabilities in the scenario with $\beta = 1$. 
Figure S14: Reduction in mean squared error (with respect to NULL) of predicted probabilities in the scenario with $\beta = 1$. 

15
Figure S15: Mean squared error of predicted probabilities in the scenario with $\tau = 0.4$. 
Figure S16: Reduction in mean squared error (with respect to NULL) of predicted probabilities in the scenario with \( \tau = 0.4 \).