Supplementary material for: A Bayesian proportional hazards regression model with non-ignorably missing time-varying covariates

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Convergence Diagnostics

Geweke test statistics and p-values are presented in tables 1 through 4 for NMAR model 1, reflecting a comparison of the first 10% to the last 50% of the sample of 20,000 iterations (100,000 that were thinned every 5^{th} iteration after a burn-in period of 100,000 iterations). Out of the 72 parameters in this model, only four failed this convergence criteria at the 5% significance level: phi2[4] (indicator of missing baseline weight in missingness model for second follow-up), alpha7[7] (weight change at baseline in model for weight change at final follow-up), tau2 (precision on weight change at one-year follow-up) and alpha4[7] (indicator on college education status in model for chemotherapy indicator). We should note that out of 72 parameters, with a significance level of 5%, we would expect to see approximately 4 statistically significant results (72*0.05=3.6) by chance alone. Since there was no apparent pattern to these few that did not converge, the posterior means and credible intervals did not noticeably change over a range of iterations (50,000, 100,000 and 200,000 total iterations were considered) and all of the trace plots indicated stationarity, we concluded that convergence had been achieved.

We also present trace plots for key parameters in the NMAR model, specifically those of inferential interest (β from the proportional hazards model) and those that are related to the portion of the model accounting for the non-ignorable missingness (ϕ from the models for the indicators of missing weight change); see figures 1 and 2, respectively. Visual examination indicates that the parameters for these models achieved acceptable convergence.

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Table 1: Geweke test statistic and p-values for convergence for parameters from proportional hazards model from selection model NMAR 1.

	Geweke z-statistic	Geweke p-value (2 sided)
Time to death		
beta[1]	-0.69	0.49
beta[2]	0.98	0.33
beta[3]	0.19	0.85
beta[4]	-0.65	0.52
beta[5]	1.16	0.25
beta[6]	-0.62	0.54
beta[7]	-0.13	0.90
beta[8]	-0.44	0.66
Baseline hazards		
lambda[1]	0.96	0.34
lambda[2]	0.65	0.52
lambda[3]	0.74	0.46
lambda[4]	0.80	0.42
lambda[5]	0.64	0.52
lambda[6]	0.62	0.53
lambda[7]	0.62	0.53
lambda[8]	0.66	0.51
lambda[9]	0.69	0.49
lambda[10]	0.58	0.56

Table 2: Geweke test statistic and p-values for convergence for parameters from model for missing weight change for selection model NMAR 1.

	Geweke z-statistic	Geweke p-value (2 sided)
At diagnosis		
phi1[1]	0.90	0.37
phi1[2]	0.04	0.97
phi1[3]	-0.69	0.49
1-year after diagnosis		
phi2[1]	-0.04	0.97
phi2[2]	0.81	0.42
phi2[3]	0.09	0.93
phi2[4]	-2.03	0.04[a]
At follow-up		
phi3[1]	0.32	0.75
phi3[2]	0.27	0.79
phi3[3]	-0.40	0.69
phi3[4]	-1.15	0.25
phi3[5]	0.42	0.68
phi3[6]	0.92	0.36

[a]Statistically significant at α=0.05.

Table 3: Geweke test statistic and p-values for convergence for parameters from models for distribution of post-diagnosis weight change for selection model NMAR 1.

	Geweke z-statistic	Geweke p-value (2 sided)
Percent change in bodyweight		
At diagnosis		
alpha5[1]	-0.13	0.90
alpha5[2]	-0.31	0.76
alpha5[3]	0.97	0.33
alpha5[4]	1.24	0.21
alpha5[5]	0.55	0.58
tau1 (precision)	-0.03	0.98
1-year after diagnosis		
alpha6[1]	-1.27	0.20
alpha6[2]	0.99	0.32
alpha6[3]	0.16	0.88
alpha6[4]	-1.24	0.22
alpha6[5]	0.88	0.38
alpha6[6]	-0.02	0.99
tau2 (precision)	-2.12	0.03[a]
At follow-up		
alpha7[1]	0.01	1.00
alpha7[2]	-0.24	0.81
alpha7[3]	0.47	0.64
alpha7[4]	-0.45	0.65
alpha7[5]	0.63	0.53
alpha7[6]	0.05	0.96
alpha7[7]	-3.02	0.00[a]
tau3 (precision)	0.05	0.96

[a]Statistically significant at α=.05.

Table 4: Geweke test statistic and p-values for convergence for parameters from covariate models for selection model NMAR 1.

	Geweke z-statistic	Geweke p-value (2 sided)
Chemotherapy		
alpha4[1]	0.82	0.41
alpha4[2]	-0.83	0.41
alpha4[3]	-0.75	0.45
alpha4[4]	-0.54	0.59
alpha4[5]	-0.48	0.63
alpha4[6]	-0.56	0.58
alpha4[7]	-2.03	0.04[a]
alpha4[8]	-1.28	0.20
ER Status		
alpha3[1]	-0.23	0.82
alpha3[2]	0.27	0.78
PR Status		
alpha2[1]	0.23	0.82
alpha2[2]	-0.18	0.86
Tumor size		
alpha1[1]	0.05	0.96
alpha1[2]	-0.03	0.98
alpha1[3]	-0.20	0.84
alpha1[4]	-0.15	0.88
alpha1[5]	-0.43	0.67
alpha1[6]	0.57	0.57
alpha1[7]	-0.37	0.71
alpha1[8]	0.76	0.45

[a]Statistically significant at α=.05.

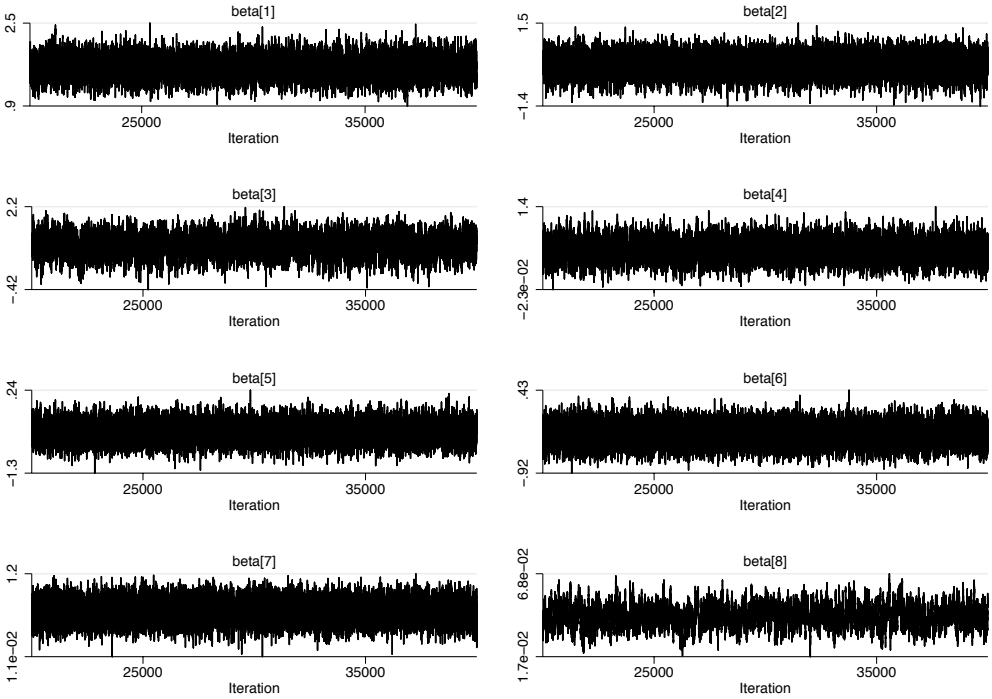

Figure 1: Traceplot of β parameters from NMAR 1 model (final 100,000 iterations after burnout period, taking every 5^{th} iteration).

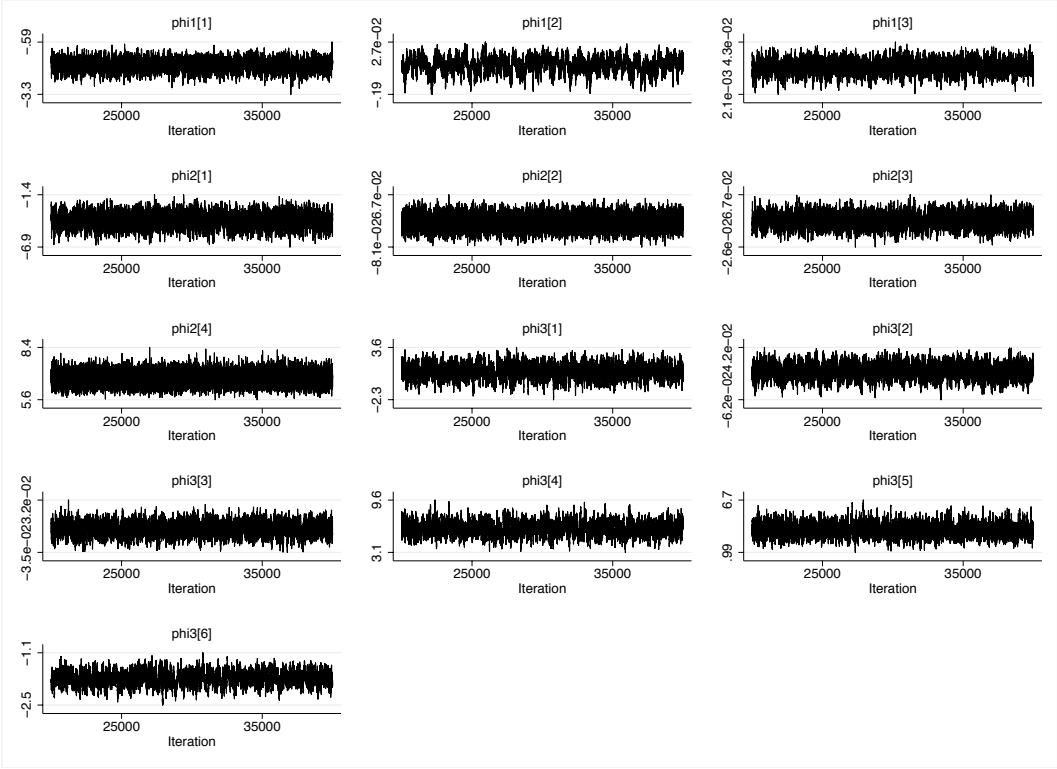

Figure 2: Traceplot of ϕ parameters from NMAR 1 model (final 100,000 iterations after burnout period, taking every 5^{th} iteration).