30.6 ANALYSIS

Figure 30.3 For Men Aged 70 and Born in 1920, Posterior Means of Survival Derived from the Gompertz Frailty Model. For both education groups, five survival curves corresponding to the five clusters in the data

model (30.6), the parameter vectors for the baseline hazards are \( \gamma = (\gamma_{12}, \gamma_{21}, \gamma_{23}) \), and \( \beta_0 = (\beta_{12.0}, \beta_{13.0}, \beta_{21.0}, \beta_{23.0}) \). For the covariates effects we have \((\beta_{12.1}, \beta_{12.2}, \beta_{12.3})\), and for the frailty terms we have \((\sigma, \tau)\). Analogous to the survival frailty model, for the entries of \( \gamma \), \( \beta_0 \), and \((\beta_{12.1}, \beta_{12.2}, \beta_{12.3})\), we specify vague priors given by \( N(0, 10) \). For the standard deviations of the frailty distributions, we use \( U(0, 5) \).

We also investigated a model where the individual frailty for the transition from the disability state to the death state was specified as \( \theta v_i \), with \( \theta \) a parameter to be estimated from the data, i.e., \( h_{ij.23}(t) \) in (30.6) is replaced by \( h_{ij.23}(t) = h_{23.0}(t) \exp(\theta v_i) \). This model takes into account the fact that the frailty for individual \( i \) may be transition-specific with respect to death. However, the parameter \( \theta \) could not be identified using the data at hand. For \( \theta \) to be identified, multi-state data is needed where many individuals are observed in both state 1 and state 2 several times.

Table 30.3 presents posterior means and 95% CIs for the model parameters in the three-state model. The effect of age parameterized by \( \gamma_{rs} \) is as expected. For the transitions 1 \( \rightarrow \) 2, 1 \( \rightarrow \) 3, and 2 \( \rightarrow \) 3 the effect is positive, showing the increase of risk of a transition when men get older. The negative effect for transitions 2 \( \rightarrow \) 1 is also understandable, as recovery from disability becomes less likely with increasing age.

For the hazard of transition 1 \( \rightarrow \) 2, the effect of more education is negative (the posterior mean of \( \beta_{12.1} \) is \(-0.34\)). This effect