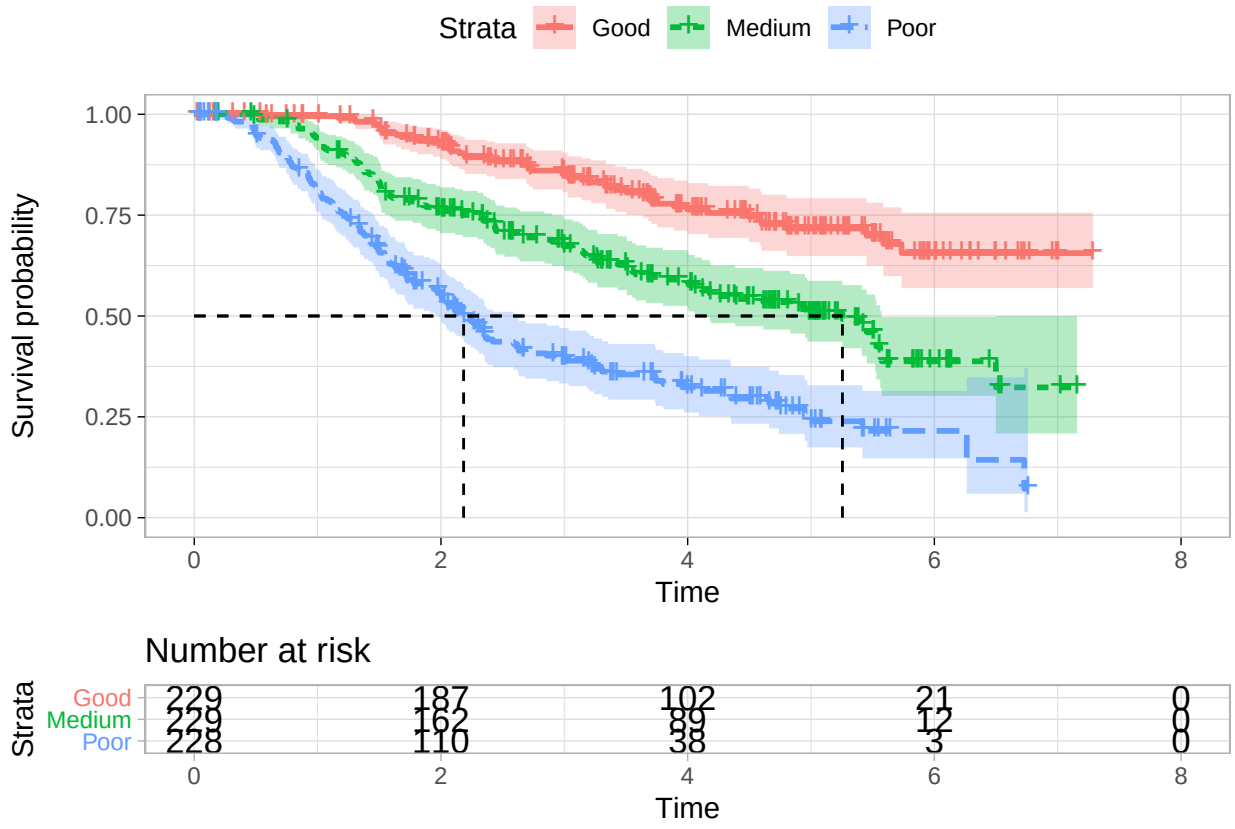
PERSUADE OUTPUT

Authors

Contents

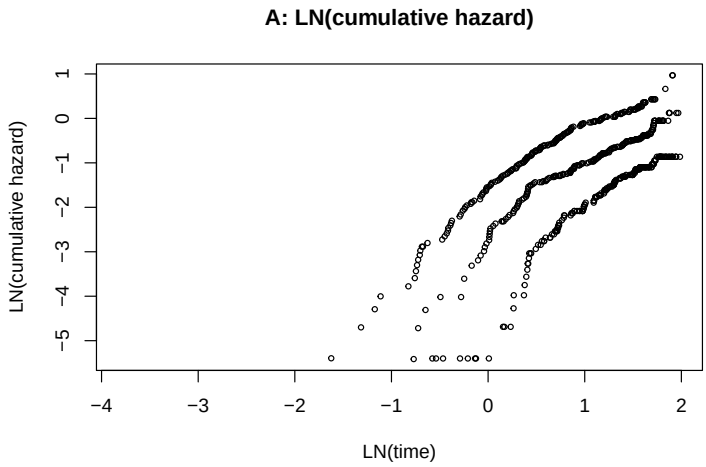
2020-07-02

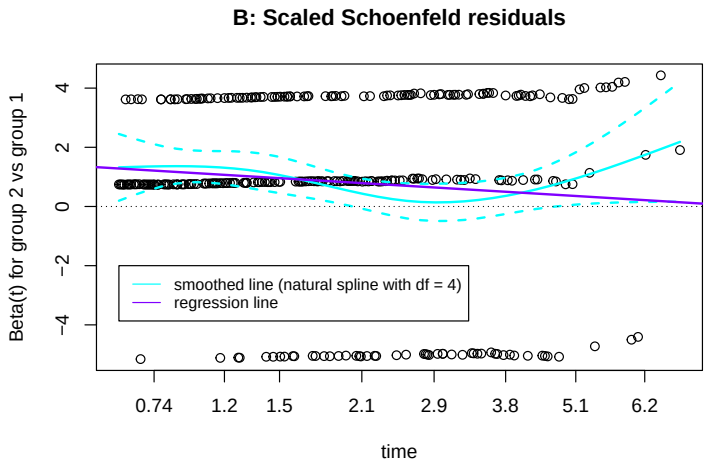
Kaplan-Meier

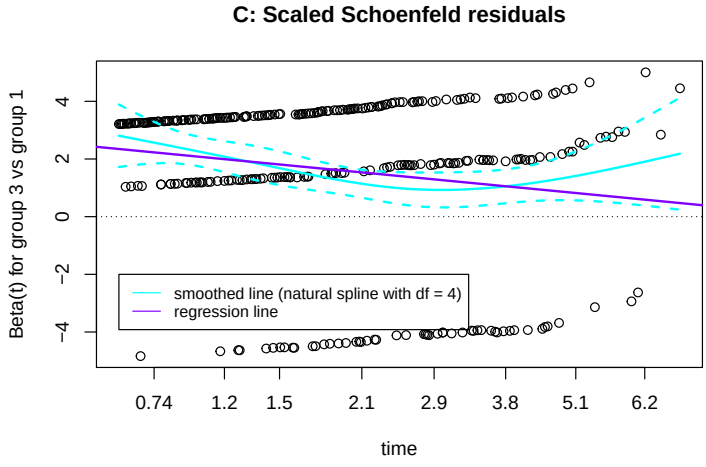


Stratified models?

Should stratified parametric survival models be used?

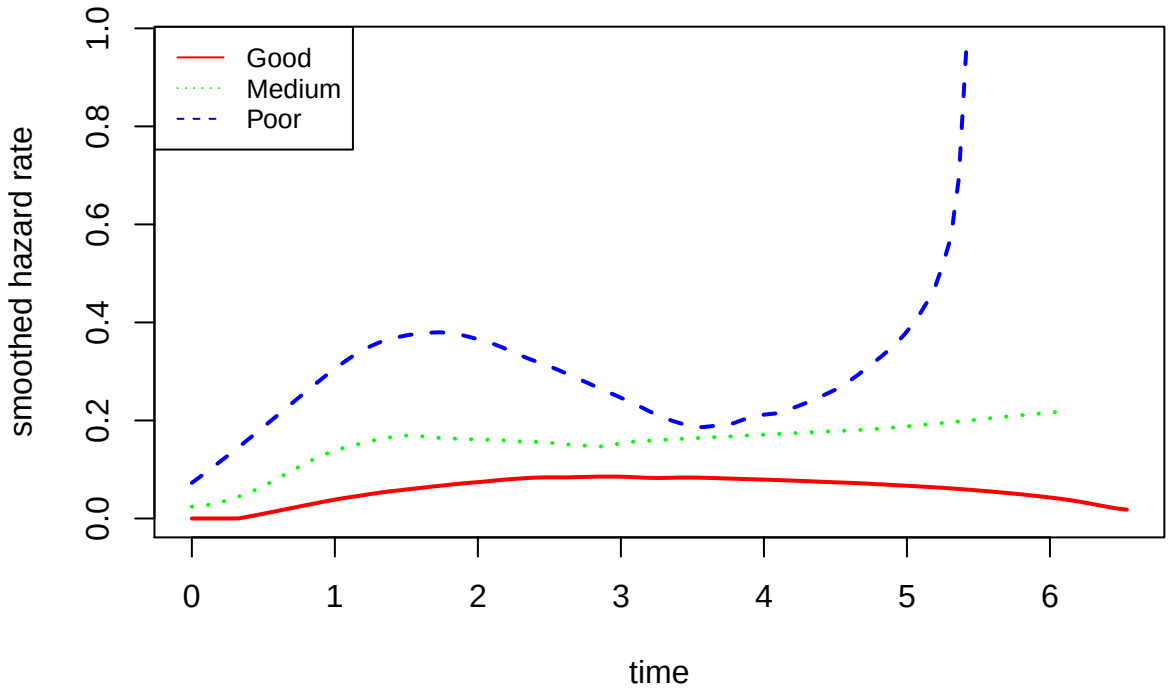






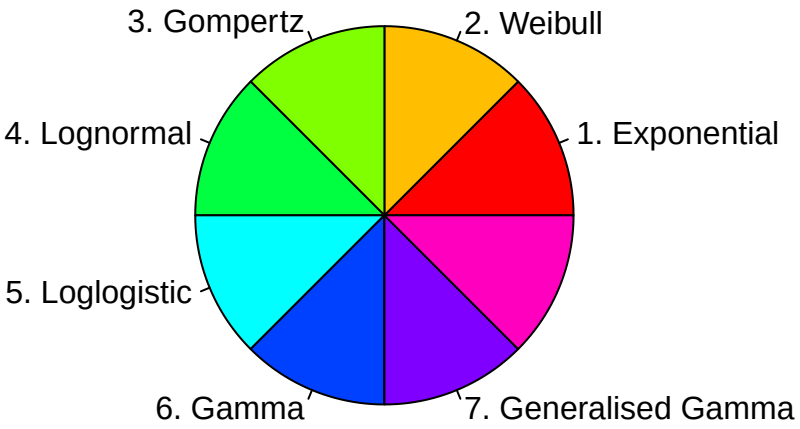
Monotonic hazard models?

Should parametric survival models assuming a monotonic hazard rate (i.e. exponential, Weibull, Gompertz) be used?



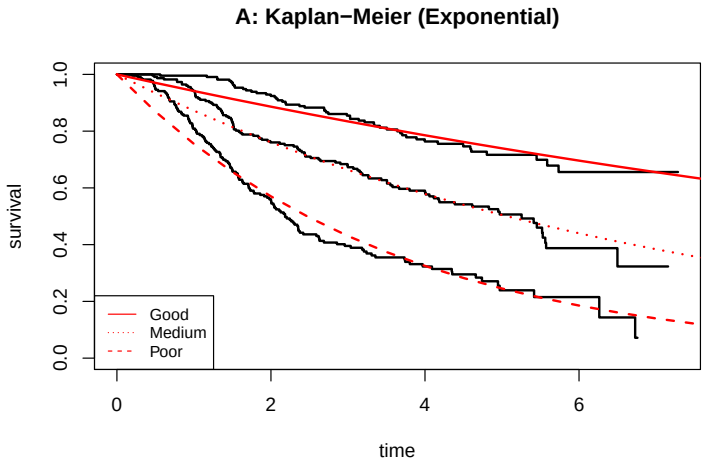
Standard parametric models?

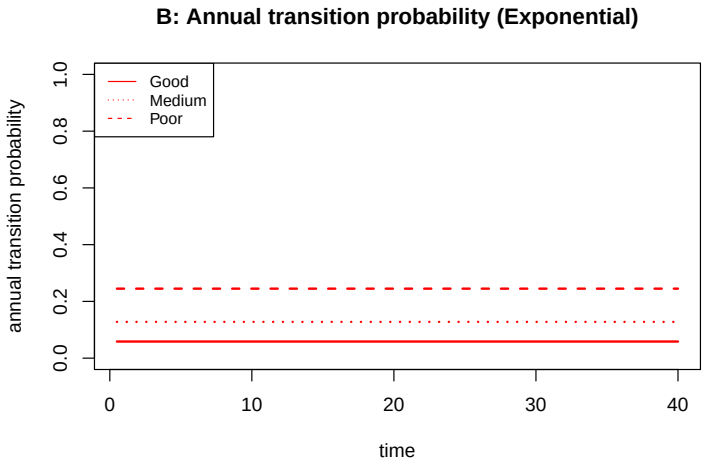
Do standard parametric models provide an appropriate fit to the data?

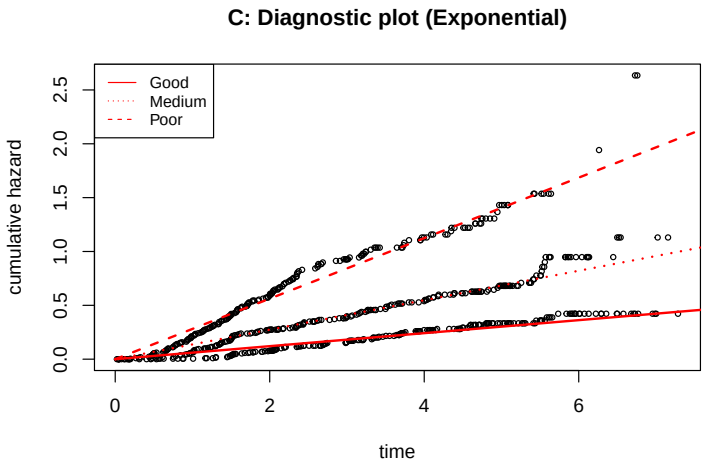


	Distribution	AIC	BIC
7	ggam	1589.049	1629.826
4	lnorm	1592.880	1620.066
5	llog	1609.294	1636.479
6	gam	1621.982	1649.167
2	weib	1632.618	1659.803
3	gom	1660.954	1688.140
1	exp	1668.212	1681.805

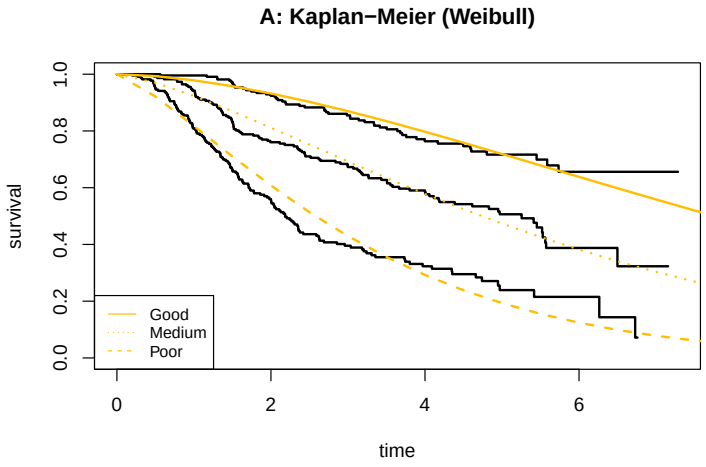
Exponential

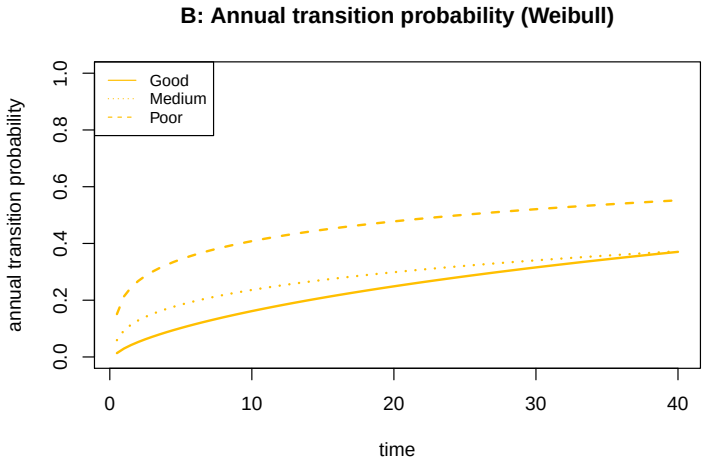


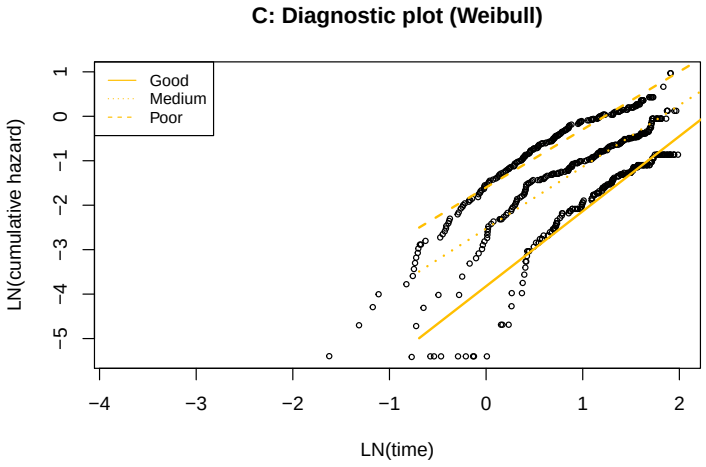




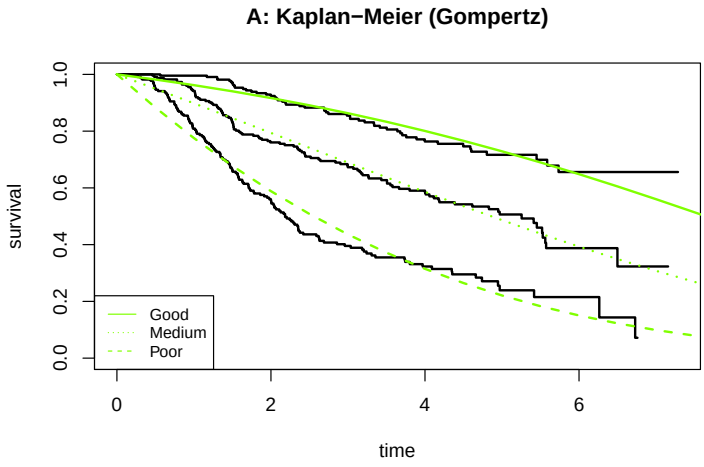
Weibull

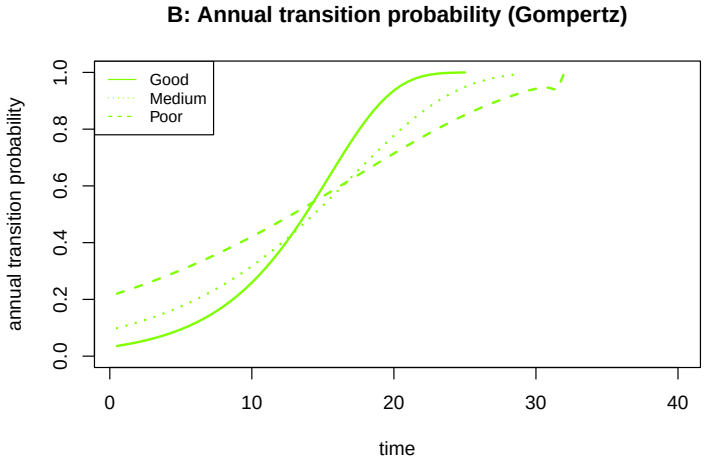

A: Kaplan−Meier (Weibull)
survival
0.0
0.2
0.4
0.6
0.8
1.0
Good
Medium
Poor
0
2
4
6
time

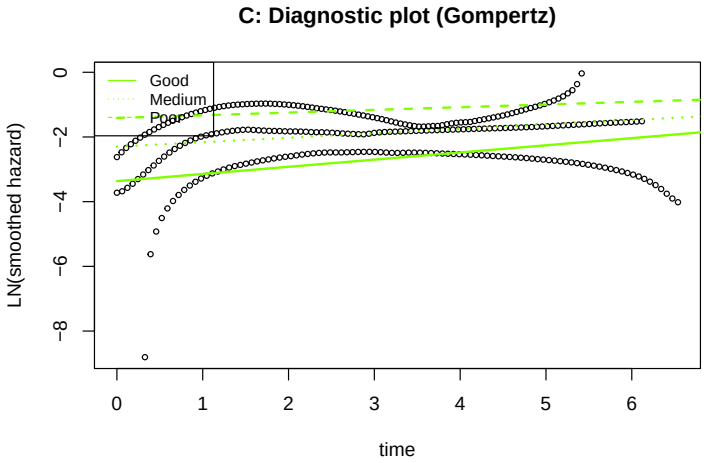

B: Annual transition probability (Weibull)
annual transition probability
0.0
0.2
0.4
0.6
0.8
1.0
Good
Medium
Poor
0
10
20
30
40
time


C: Diagnostic plot (Weibull)
LN(cumulative hazard)
−5
−4
−3
−2
−1
0
1
Good
Medium
Poor
−4
−3
−2
−1
0
1
2
LN(time)

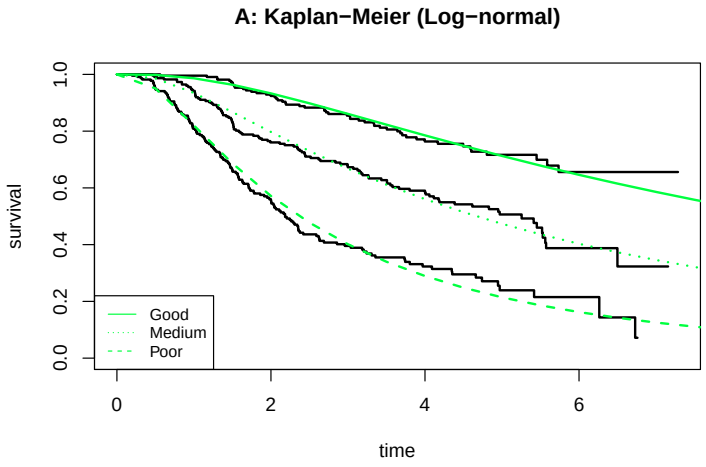
Gompertz

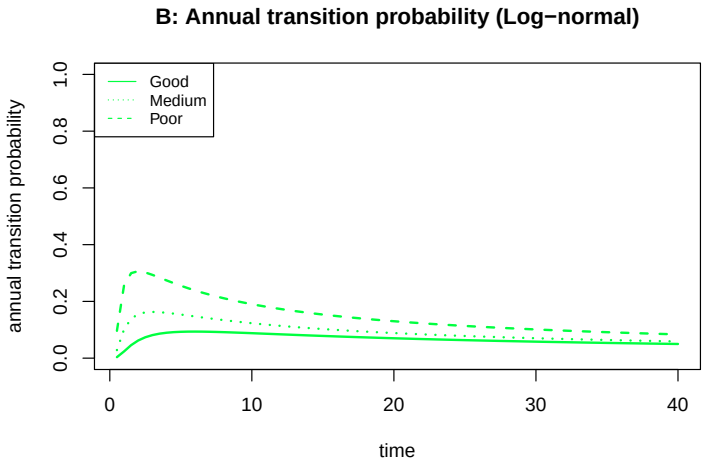

A: Kaplan−Meier (Gompertz)
survival
0.0
0.2
0.4
0.6
0.8
1.0
0
2
4
6
time
Good
Medium
Poor

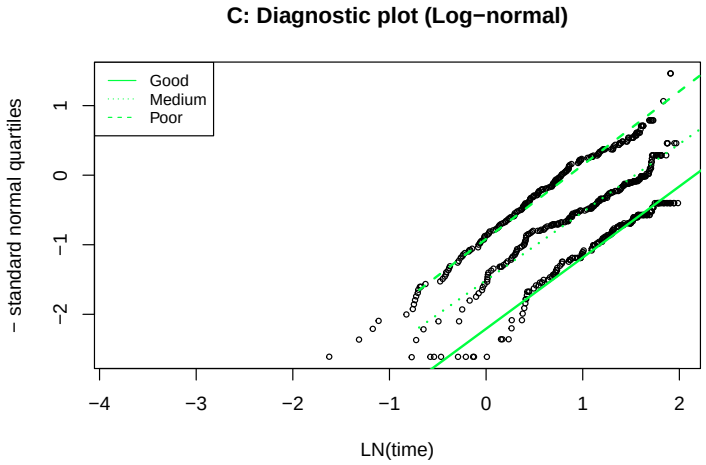

B: Annual transition probability (Gompertz)
annual transition probability
0.0
0.2
0.4
0.6
0.8
1.0
0
10
20
30
40
time
Good
Medium
Poor


C: Diagnostic plot (Gompertz)
LN(smoothed hazard)
0
−2
−4
−6
−8
0
1
2
3
4
5
6
time
Good
Medium
Poor

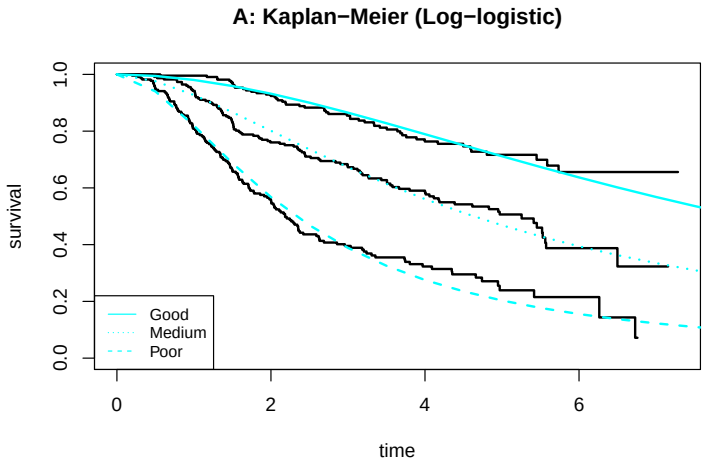
Lognormal

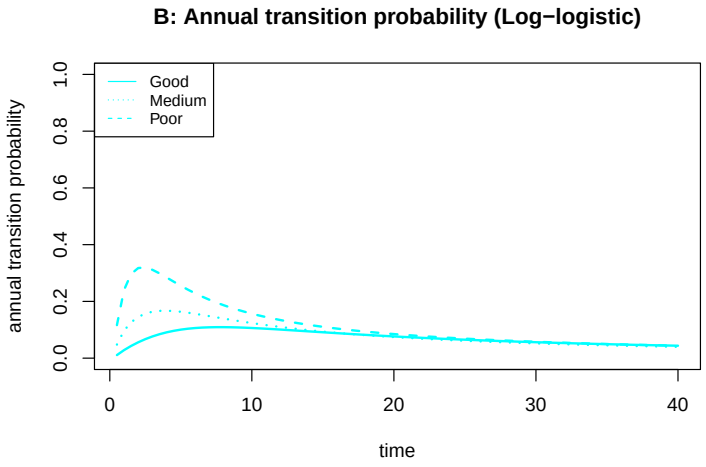

A: Kaplan−Meier (Log−normal)
survival
0.0
0.2
0.4
0.6
0.8
1.0
Good
Medium
Poor
0
2
4
6
time

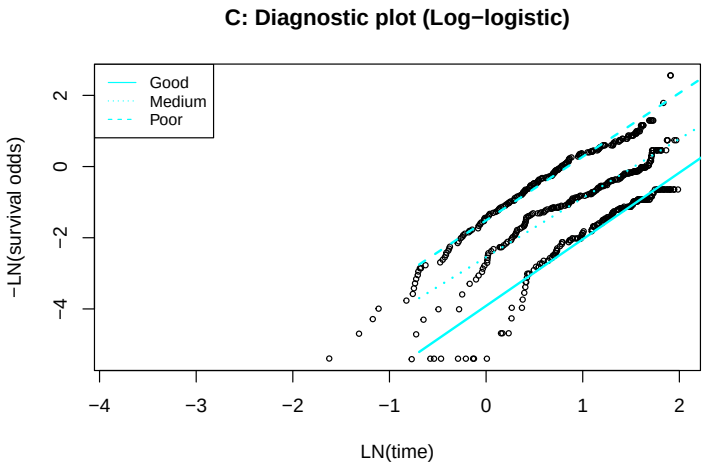

B: Annual transition probability (Log−normal)
annual transition probability
0.0
0.2
0.4
0.6
0.8
1.0
Good
Medium
Poor
0
10
20
30
40
time


C: Diagnostic plot (Log−normal)
− standard normal quartiles
−2
−1
0
1
Good
Medium
Poor
−4
−3
−2
−1
0
1
2
LN(time)

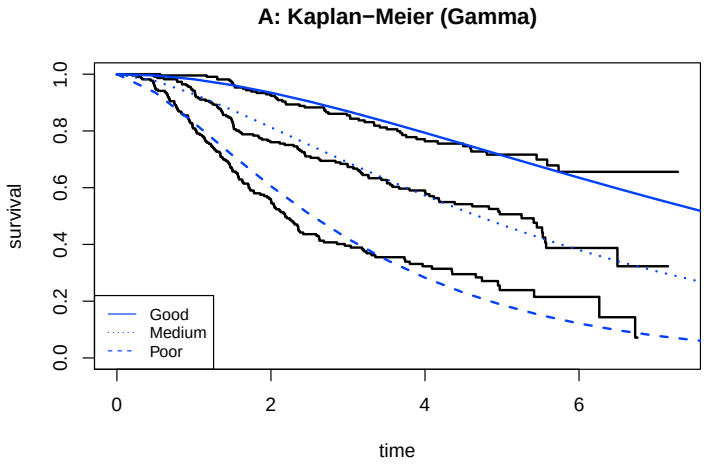
Loglogistic

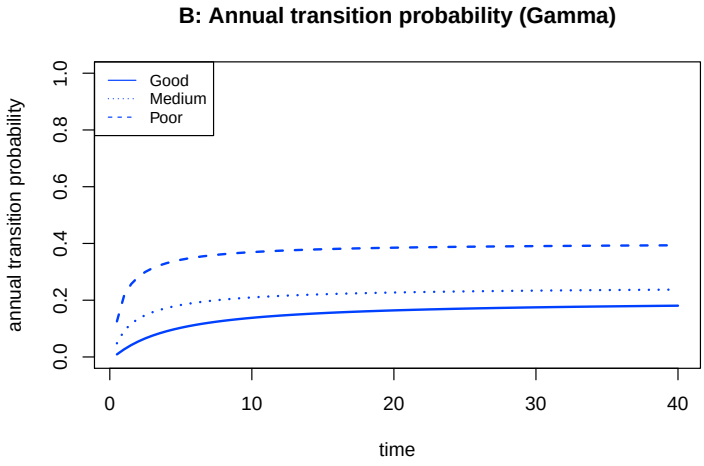


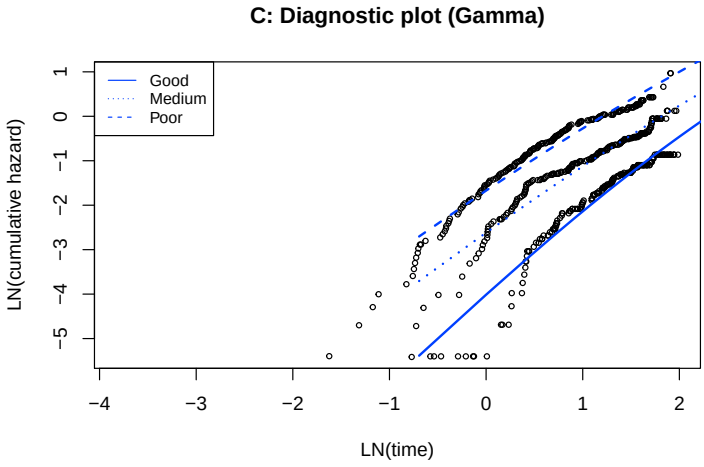




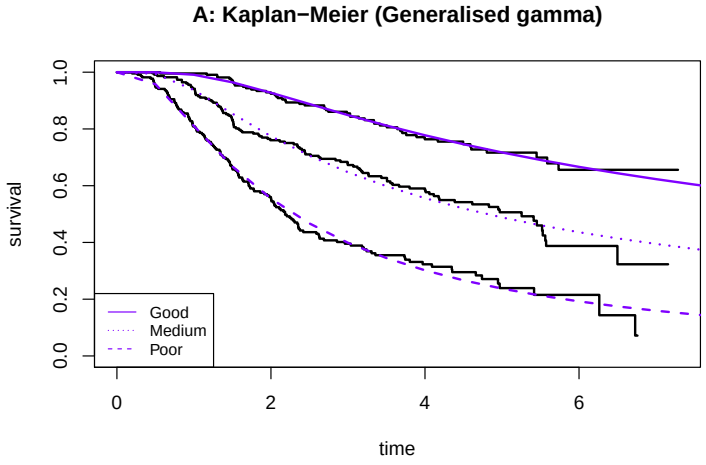
Gamma

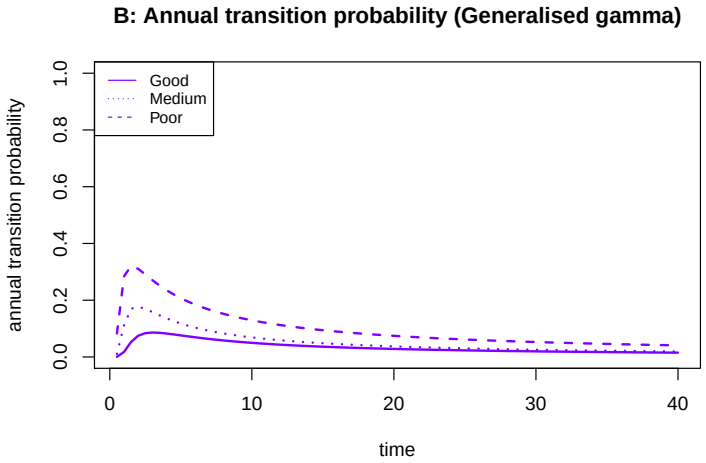

A: Kaplan−Meier (Gamma)
survival
0.0
0.2
0.4
0.6
0.8
1.0
Good
Medium
Poor
0
2
4
6
time

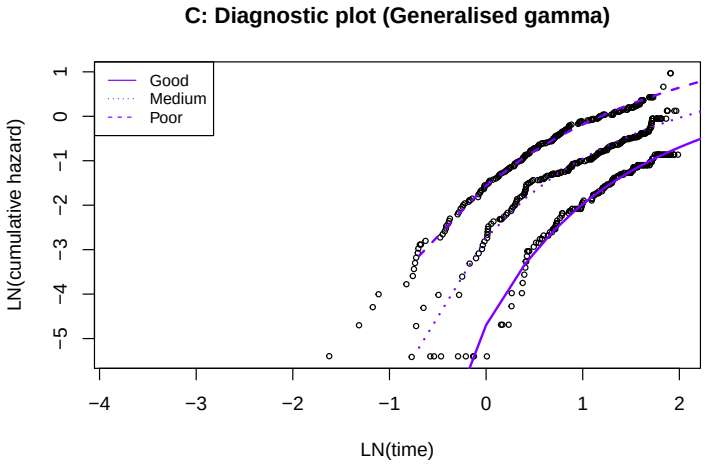

B: Annual transition probability (Gamma)
annual transition probability
0.0
0.2
0.4
0.6
0.8
1.0
Good
Medium
Poor
0
10
20
30
40
time


C: Diagnostic plot (Gamma)
LN(cumulative hazard)
−5
−4
−3
−2
−1
0
1
Good
Medium
Poor
−4
−3
−2
−1
0
1
2
LN(time)

Generalised Gamma

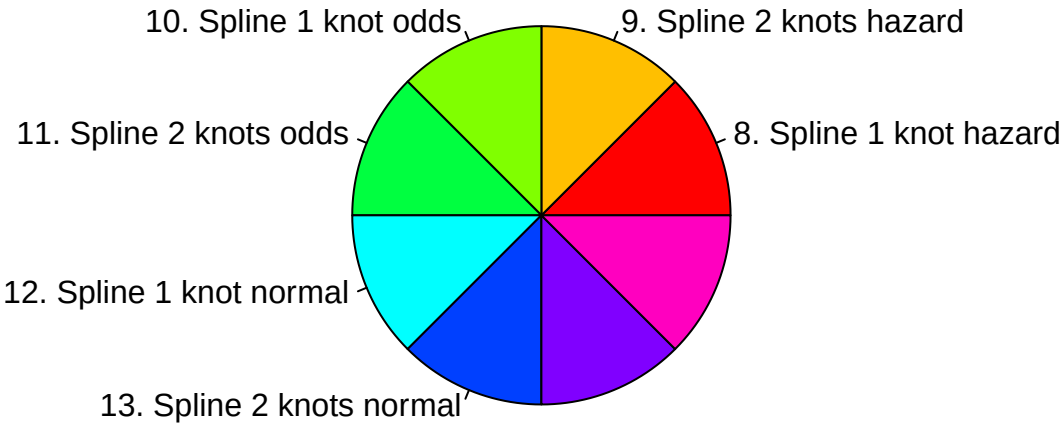






Parametric spline models?

If standard parametric models are not appropriate, are spline models a more appropriate fit to the data?



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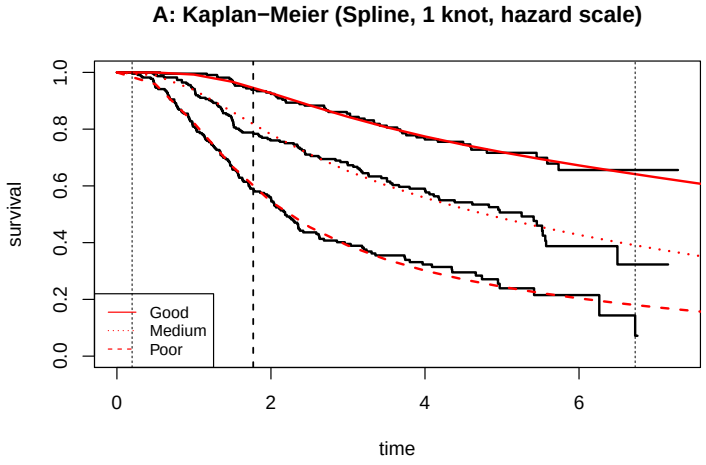
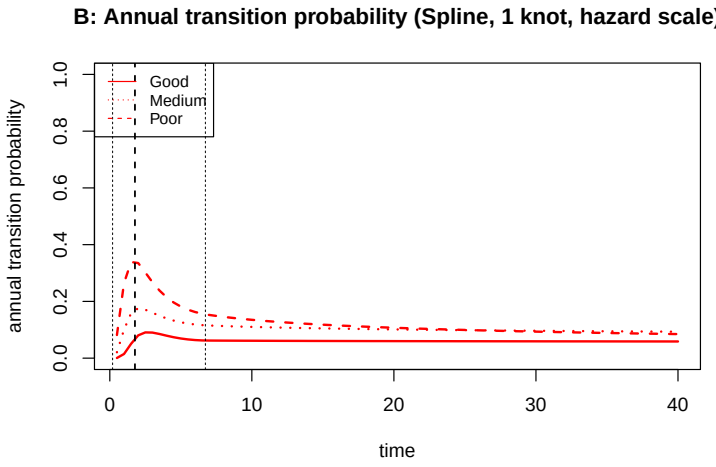
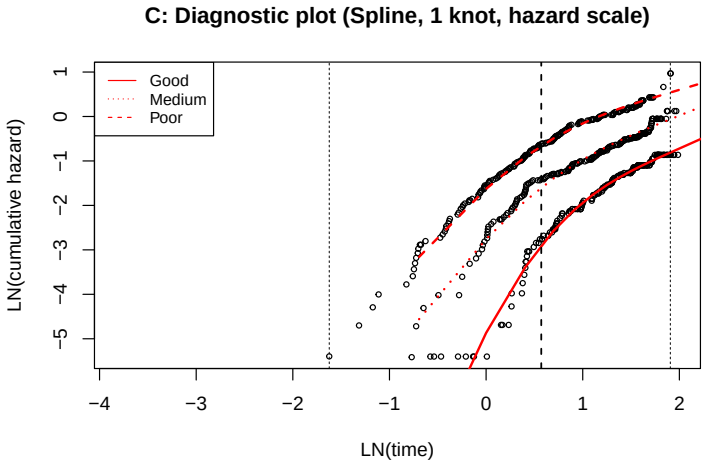
6	gam	1621.982	1649.167
2	weib	1632.618	1659.803
3	gom	1660.954	1688.140
1	exp	1668.212	1681.805

	Scale	knots	AIC	BIC
4	hazard	2	1585.894	1640.264
5	odds	2	1587.289	1641.659
3	normal	1	1587.682	1628.460
6	normal	2	1588.343	1642.714
1	hazard	1	1589.327	1630.105
2	odds	1	1590.221	1630.999

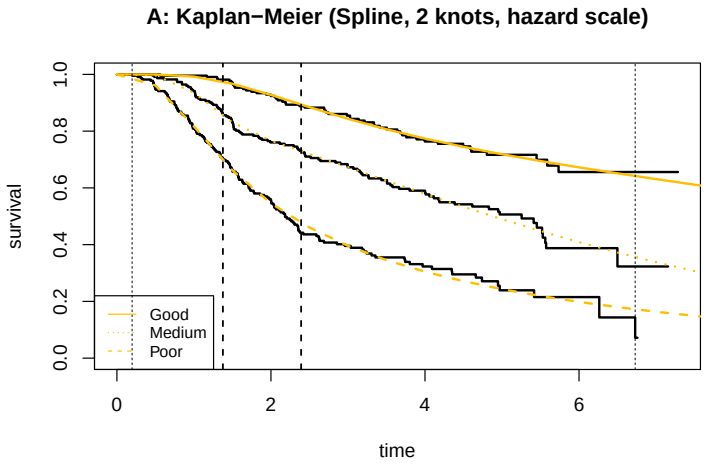
Spline hazard 1 knot

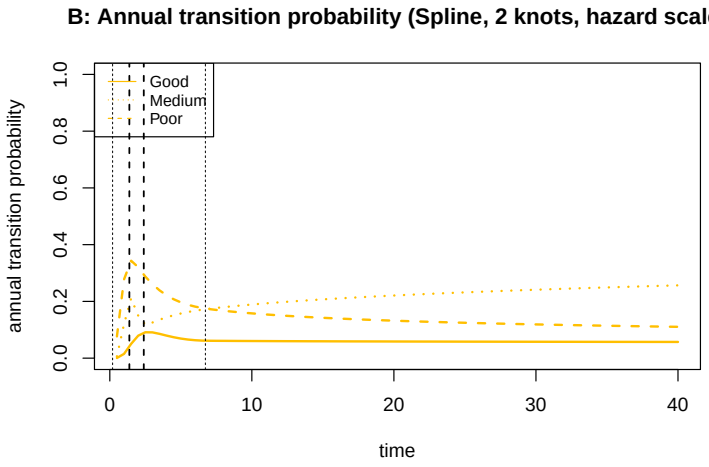


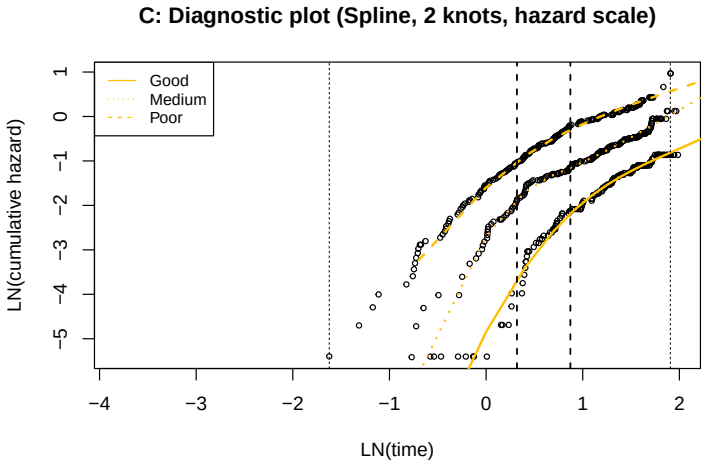




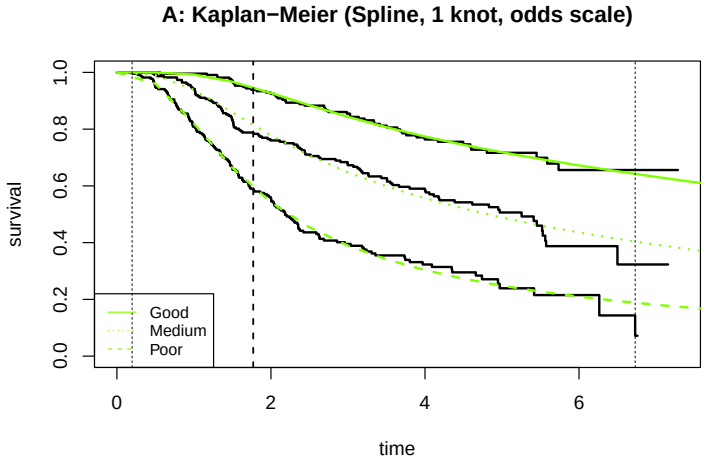
Spline hazard 2 knots

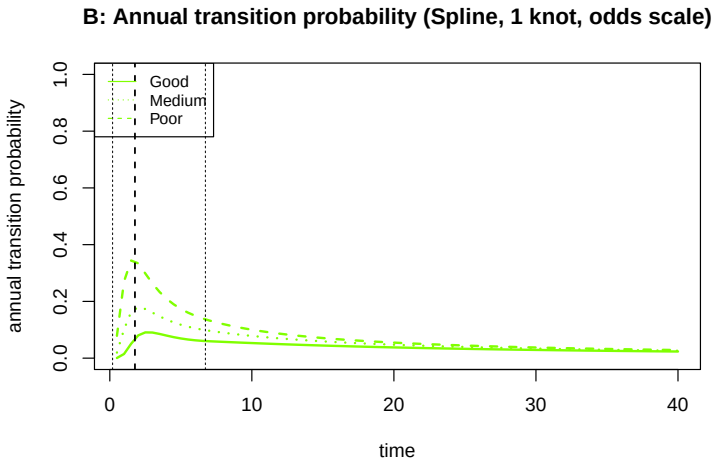


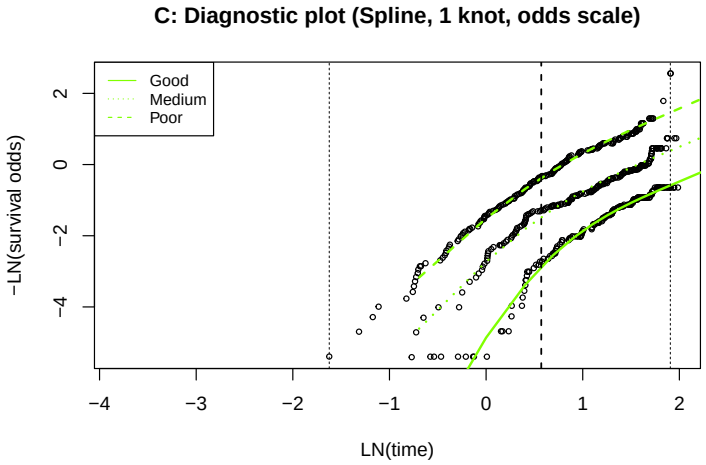




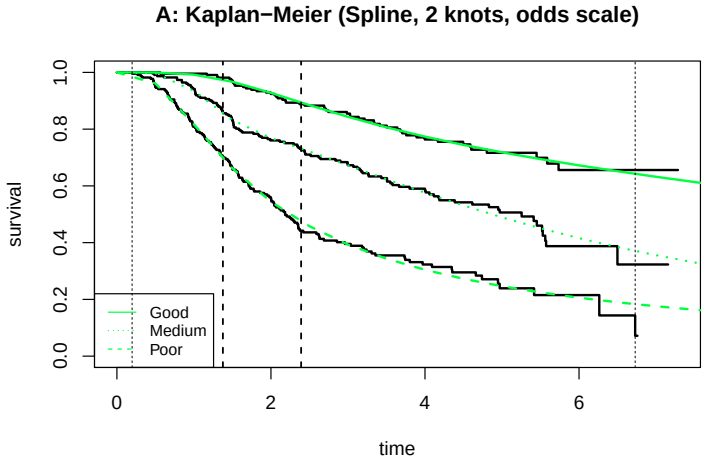
Spline odds 1 knot

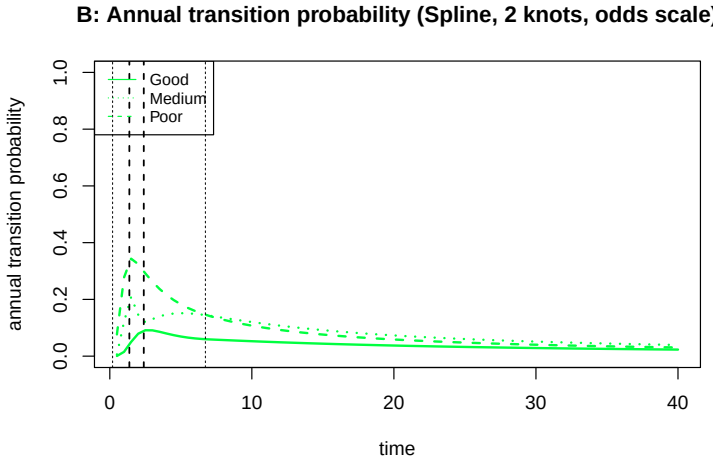


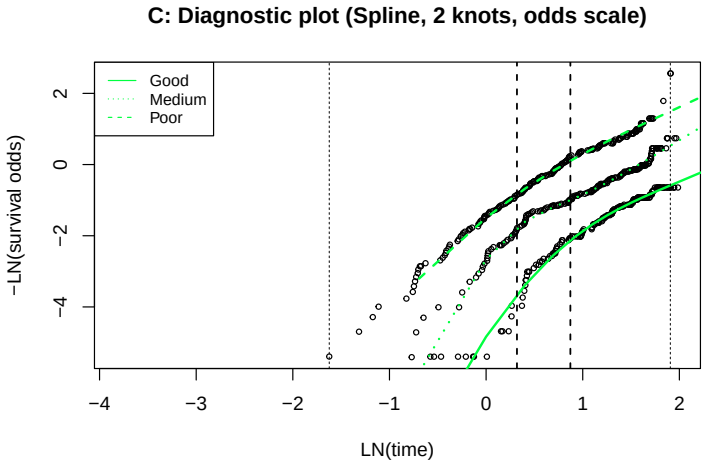




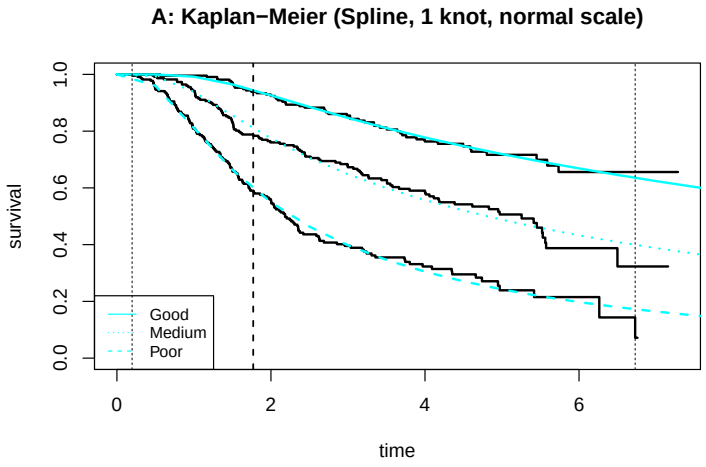
Spline odds 2 knots

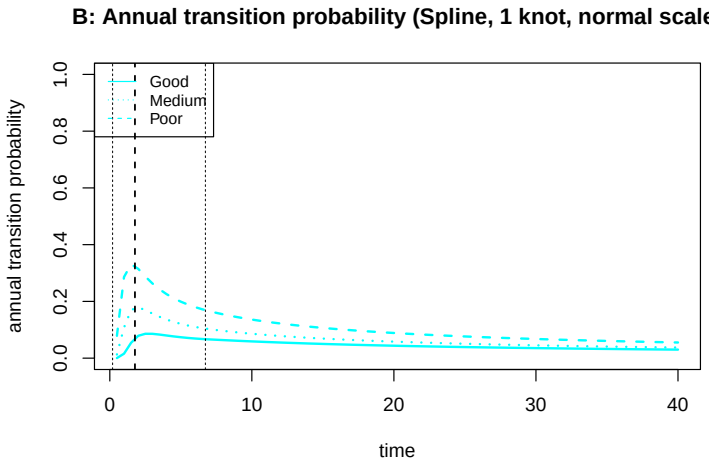


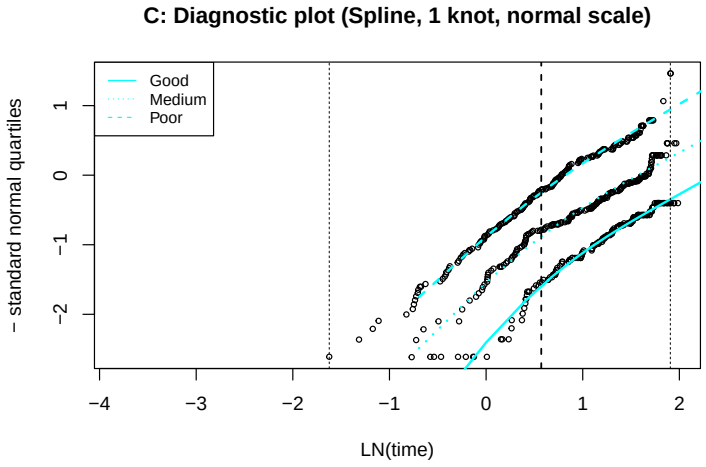




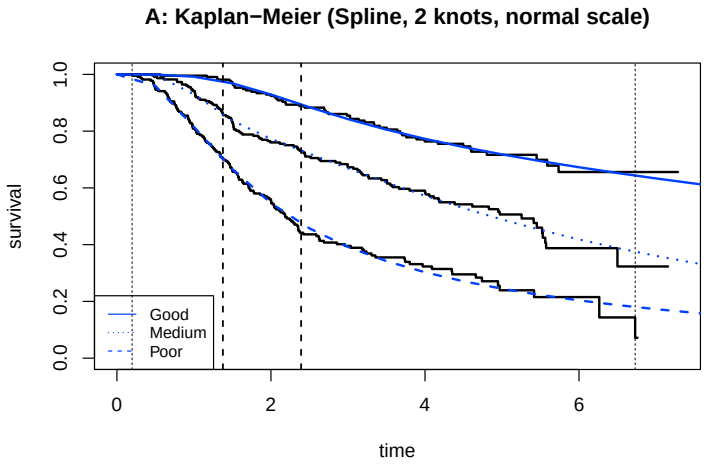
Spline normal 1 knot

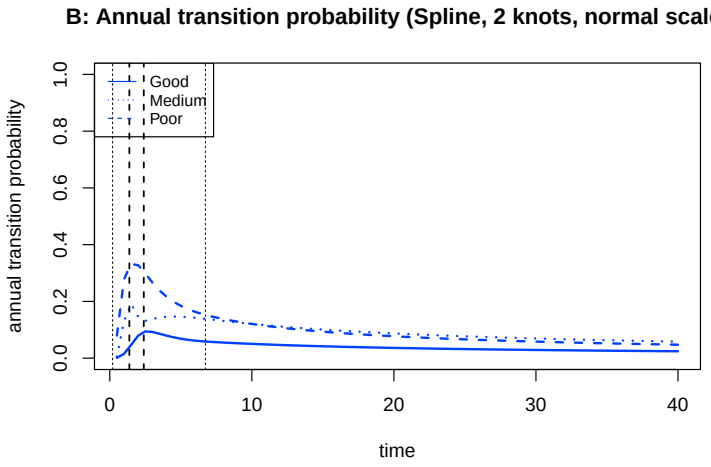


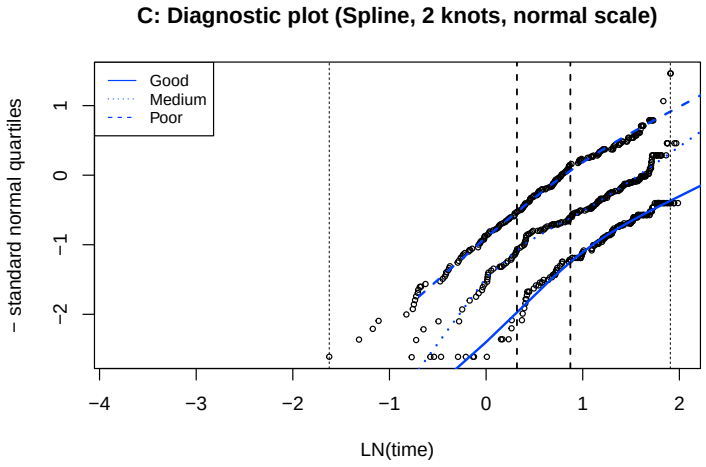




Spline normal 2 knots



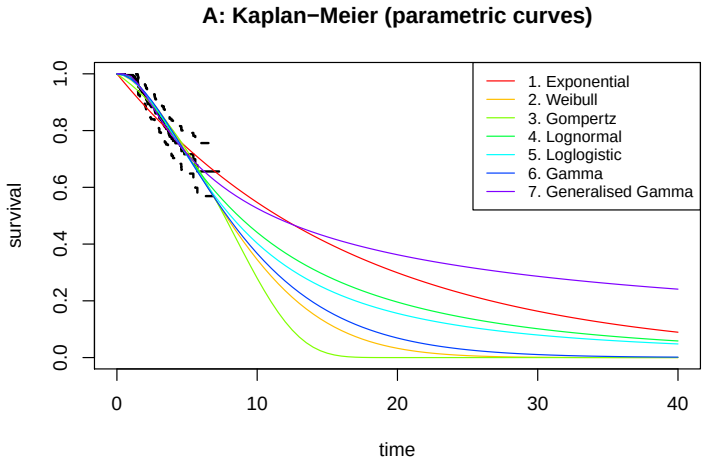


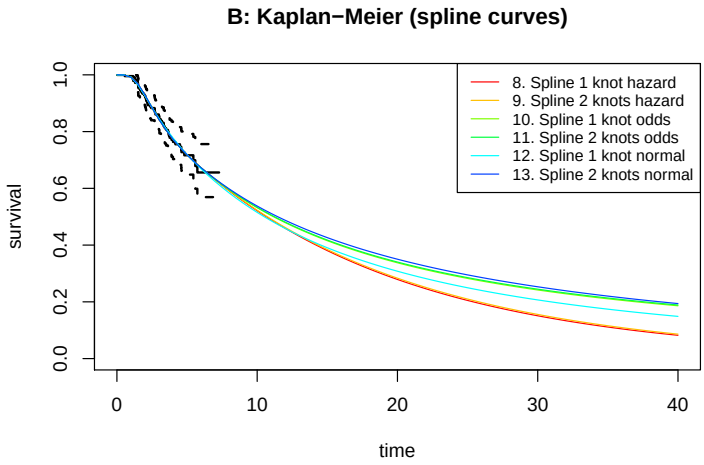


Validity of long-term extrapolation?

What model(s) is/are more appropriate for long-term extrapolation? Are/is the selected model(s) plausible in comparison with general population mortality?

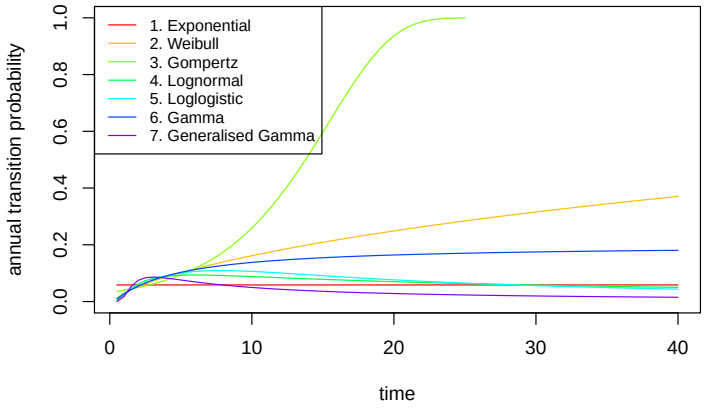
Group Good



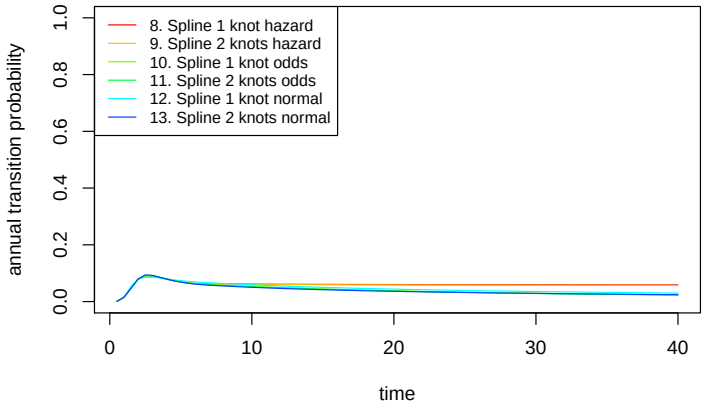


	T= 0	T= 1	T= 2	T= 3	T= 4	T= 5	T= 10	T= 15	T= 20	T= 25	T= 30	T= 35
1. Exponential	1	0.941	0.886	0.834	0.785	0.739	0.547	0.404	0.299	0.221	0.163	0.121
2. Weibull	1	0.978	0.932	0.870	0.797	0.719	0.345	0.122	0.033	0.007	0.001	0.000
3. Gompertz	1	0.962	0.917	0.863	0.801	0.729	0.280	0.015	0.000	0.000	0.000	0.000
4. Lognormal	1	0.986	0.933	0.861	0.785	0.713	0.441	0.287	0.196	0.139	0.102	0.076
5. Loglogistic	1	0.980	0.932	0.865	0.789	0.712	0.403	0.240	0.156	0.108	0.080	0.061
6. Gamma	1	0.982	0.935	0.869	0.793	0.714	0.367	0.165	0.069	0.027	0.011	0.004
7. Generalised Gamma	1	0.991	0.928	0.849	0.778	0.717	0.526	0.425	0.362	0.319	0.286	0.261
8. Spline 1 knot hazard	1	0.992	0.927	0.843	0.774	0.719	0.521	0.381	0.279	0.205	0.151	0.111
9. Spline 2 knots hazard	1	0.992	0.928	0.843	0.774	0.719	0.523	0.384	0.283	0.210	0.156	0.116
10. Spline 1 knot odds	1	0.992	0.927	0.843	0.774	0.718	0.532	0.415	0.338	0.283	0.242	0.211
11. Spline 2 knots odds	1	0.992	0.928	0.843	0.774	0.718	0.533	0.418	0.340	0.285	0.245	0.213
12. Spline 1 knot normal	1	0.992	0.926	0.847	0.778	0.719	0.515	0.391	0.308	0.250	0.207	0.174
13. Spline 2 knots normal	1	0.992	0.929	0.842	0.773	0.718	0.538	0.426	0.350	0.295	0.253	0.220

C: Annual transition probability (parametric curves)

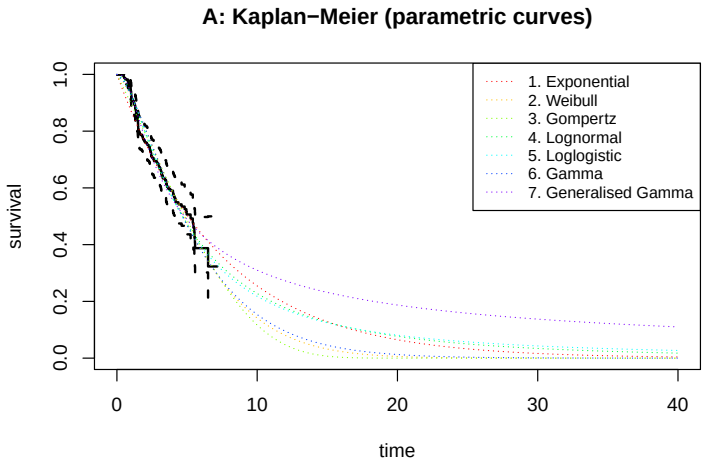


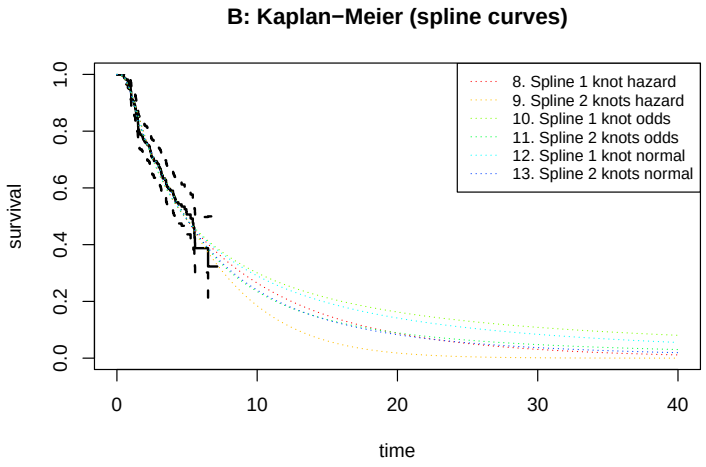
D: Annual transition probability (spline curves)



	Min	Q1	Median	Q3	Max
1. Exponential	0.0585969	0.0585969	0.0585969	0.0585969	0.0585969
2. Weibull	0.0134926	0.1641610	0.2507474	0.3170860	0.3704265
3. Gompertz	0.0358674	0.1289836	0.4243279	0.8897705	1.0000000
4. Lognormal	0.0035242	0.0564742	0.0669435	0.0816466	0.0935926
5. Loglogistic	0.0108361	0.0535545	0.0698593	0.0936004	0.1092076
6. Gamma	0.0091337	0.1390115	0.1644832	0.1750177	0.1806585
7. Generalised Gamma	0.0003592	0.0189735	0.0268357	0.0454799	0.0860838
8. Spline 1 knot hazard	0.0006045	0.0592047	0.0598816	0.0610069	0.0907018
9. Spline 2 knots hazard	0.0006430	0.0576382	0.0585136	0.0599758	0.0911975
10. Spline 1 knot odds	0.0006235	0.0281280	0.0364731	0.0503972	0.0907451
11. Spline 2 knots odds	0.0006730	0.0277991	0.0360401	0.0499037	0.0912259
12. Spline 1 knot normal	0.0003052	0.0345981	0.0424906	0.0555438	0.0858716
13. Spline 2 knots normal	0.0011199	0.0281489	0.0349746	0.0469783	0.0942191

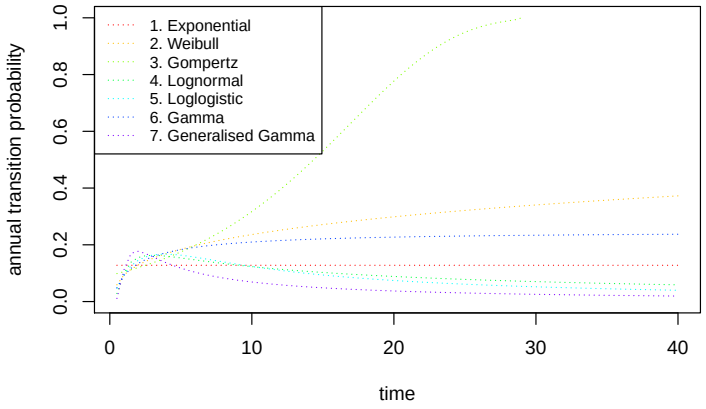
Group Medium



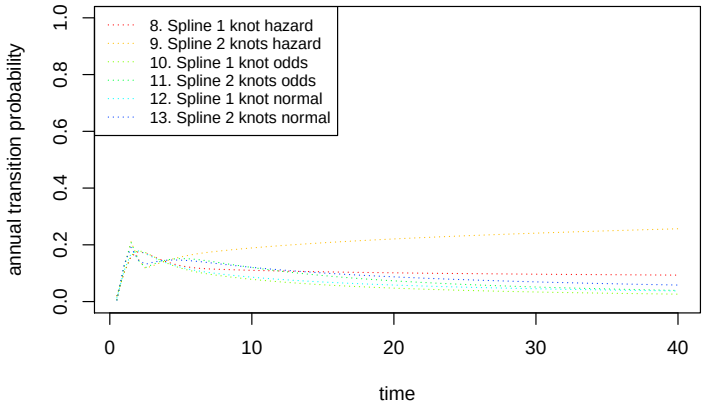


	T= 0	T= 1	T= 2	T= 3	T= 4	T= 5	T= 10	T= 15	T= 20	T= 25	T= 30	T= 35
1. Exponential	1	0.872	0.761	0.663	0.578	0.505	0.255	0.128	0.065	0.033	0.016	0.008
2. Weibull	1	0.923	0.811	0.693	0.578	0.474	0.141	0.032	0.006	0.001	0.000	0.000
3. Gompertz	1	0.898	0.794	0.689	0.586	0.486	0.117	0.007	0.000	0.000	0.000	0.000
4. Lognormal	1	0.935	0.797	0.668	0.560	0.473	0.228	0.126	0.077	0.050	0.034	0.024
5. Loglogistic	1	0.927	0.801	0.673	0.561	0.468	0.218	0.124	0.081	0.057	0.043	0.034
6. Gamma	1	0.930	0.813	0.689	0.572	0.469	0.154	0.045	0.013	0.003	0.001	0.000
7. Generalised Gamma	1	0.937	0.774	0.648	0.556	0.488	0.310	0.232	0.187	0.158	0.138	0.122
8. Spline 1 knot hazard	1	0.939	0.782	0.652	0.558	0.486	0.265	0.150	0.087	0.052	0.031	0.019
9. Spline 2 knots hazard	1	0.935	0.766	0.673	0.579	0.490	0.184	0.061	0.018	0.005	0.001	0.000
10. Spline 1 knot odds	1	0.939	0.778	0.648	0.556	0.489	0.301	0.213	0.162	0.131	0.109	0.093
11. Spline 2 knots odds	1	0.935	0.769	0.673	0.576	0.489	0.235	0.136	0.089	0.063	0.048	0.037
12. Spline 1 knot normal	1	0.938	0.775	0.648	0.557	0.488	0.290	0.195	0.141	0.107	0.084	0.067
13. Spline 2 knots normal	1	0.930	0.773	0.669	0.572	0.489	0.240	0.135	0.083	0.054	0.037	0.026

C: Annual transition probability (parametric curves)

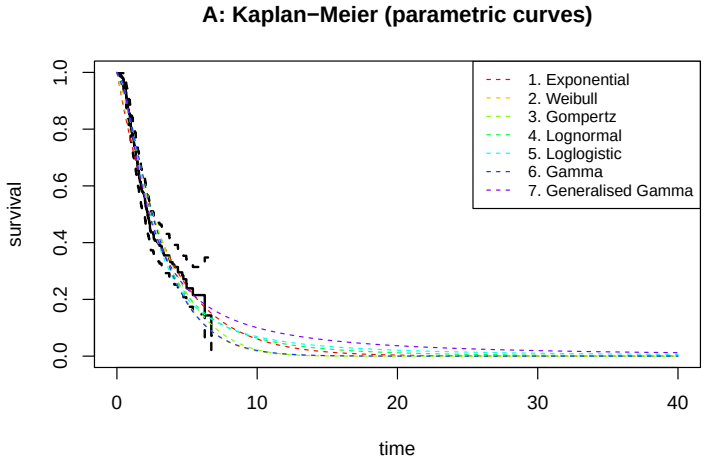


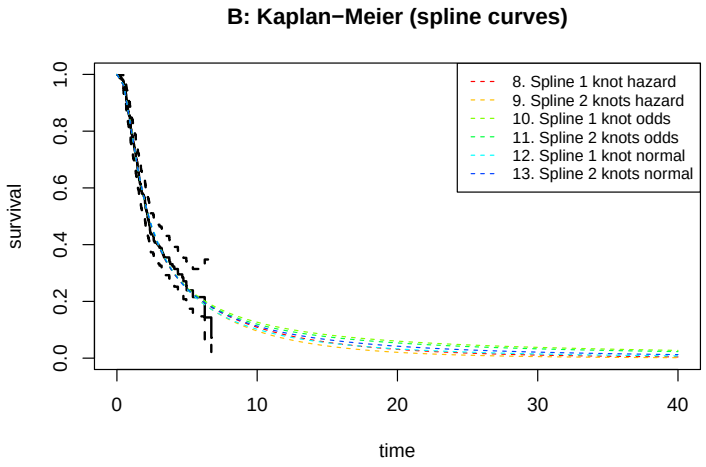
D: Annual transition probability (spline curves)



	Min	Q1	Median	Q3	Max
1. Exponential	0.1278820	0.1278820	0.1278820	0.1278820	0.1278820
2. Weibull	0.0591011	0.2381968	0.2998605	0.3413129	0.3724339
3. Gompertz	0.0986811	0.2373335	0.5186913	0.8609606	1.0000000
4. Lognormal	0.0282952	0.0692226	0.0866936	0.1171810	0.1629587
5. Loglogistic	0.0398205	0.0508351	0.0719824	0.1148545	0.1671681
6. Gamma	0.0480016	0.2105085	0.2273394	0.2338781	0.2372976
7. Generalised Gamma	0.0109341	0.0249143	0.0360207	0.0648290	0.1772175
8. Spline 1 knot hazard	0.0207293	0.0962139	0.1005759	0.1085803	0.1758852
9. Spline 2 knots hazard	0.0061802	0.1921445	0.2213455	0.2415959	0.2565416
10. Spline 1 knot odds	0.0196172	0.0330411	0.0459973	0.0747733	0.1799958
11. Spline 2 knots odds	0.0057632	0.0502183	0.0708612	0.1151671	0.2083176
12. Spline 1 knot normal	0.0128862	0.0444913	0.0569747	0.0828185	0.1788613
13. Spline 2 knots normal	0.0053472	0.0683352	0.0854055	0.1171708	0.1907920

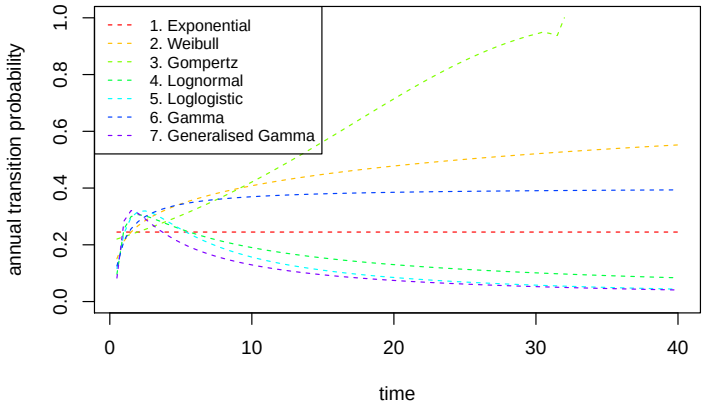
Group Poor



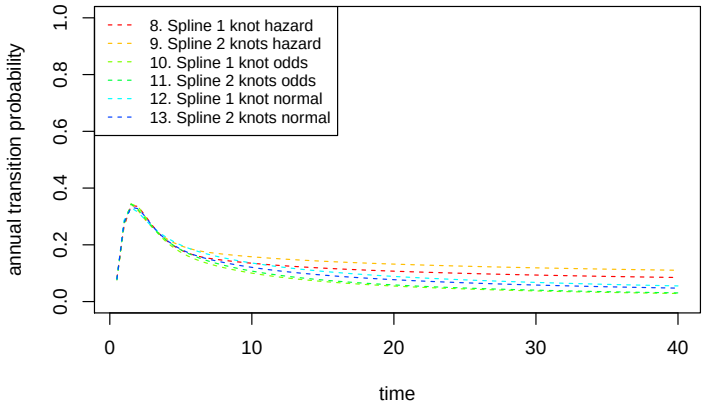


	T= 0	T= 1	T= 2	T= 3	T= 4	T= 5	T= 10	T= 15	T= 20	T= 25	T= 30	T= 35
1. Exponential	1	0.755	0.570	0.430	0.325	0.245	0.060	0.015	0.004	0.001	0.000	0.000
2. Weibull	1	0.817	0.608	0.430	0.292	0.193	0.017	0.001	0.000	0.000	0.000	0.000
3. Gompertz	1	0.776	0.588	0.436	0.315	0.221	0.022	0.001	0.000	0.000	0.000	0.000
4. Lognormal	1	0.820	0.572	0.401	0.289	0.214	0.063	0.025	0.012	0.006	0.004	0.002
5. Loglogistic	1	0.819	0.568	0.389	0.275	0.203	0.069	0.034	0.021	0.014	0.010	0.008
6. Gamma	1	0.829	0.605	0.420	0.283	0.187	0.020	0.002	0.000	0.000	0.000	0.000
7. Generalised Gamma	1	0.810	0.555	0.399	0.302	0.237	0.100	0.057	0.037	0.026	0.019	0.015
8. Spline 1 knot hazard	1	0.822	0.545	0.390	0.301	0.244	0.109	0.056	0.031	0.018	0.011	0.007
9. Spline 2 knots hazard	1	0.817	0.546	0.396	0.305	0.243	0.096	0.043	0.021	0.010	0.005	0.003
10. Spline 1 knot odds	1	0.820	0.542	0.390	0.303	0.248	0.127	0.082	0.060	0.047	0.038	0.032
11. Spline 2 knots odds	1	0.817	0.544	0.393	0.304	0.246	0.120	0.075	0.054	0.041	0.033	0.027
12. Spline 1 knot normal	1	0.811	0.549	0.398	0.305	0.242	0.102	0.054	0.033	0.021	0.015	0.011
13. Spline 2 knots normal	1	0.815	0.546	0.392	0.303	0.245	0.113	0.065	0.042	0.029	0.021	0.016

C: Annual transition probability (parametric curves)



D: Annual transition probability (spline curves)



	Min	Q1	Median	Q3	Max
1. Exponential	0.2449482	0.2449482	0.2449482	0.2449482	0.2449482
2. Weibull	0.1510049	0.4105396	0.4790497	0.5216154	0.5520052
3. Gompertz	0.2203222	0.3769816	0.6007991	0.8316903	1.0000000
4. Lognormal	0.0836825	0.0995548	0.1272985	0.1834832	0.3065423
5. Loglogistic	0.0437409	0.0573187	0.0838677	0.1475772	0.3193673
6. Gamma	0.1253666	0.3701740	0.3852505	0.3907361	0.3935243
7. Generalised Gamma	0.0407810	0.0522176	0.0736609	0.1223572	0.3209103
8. Spline 1 knot hazard	0.0815213	0.0926812	0.1057981	0.1319033	0.3389077
9. Spline 2 knots hazard	0.0766259	0.1181717	0.1307978	0.1549084	0.3434543
10. Spline 1 knot odds	0.0285342	0.0372365	0.0541059	0.0944228	0.3440970
11. Spline 2 knots odds	0.0305654	0.0399116	0.0580356	0.1012316	0.3435620
12. Spline 1 knot normal	0.0552128	0.0671541	0.0865712	0.1304175	0.3307356
13. Spline 2 knots normal	0.0473655	0.0578940	0.0764795	0.1153902	0.3323350