

Supplemental Material for
Quantifying change over time: Interpreting
time-varying effects in duration analyses

June 29, 2017

Figure 1: Even different levels of a flat baseline can alter the overall effect of a time-varying hazard ratio.

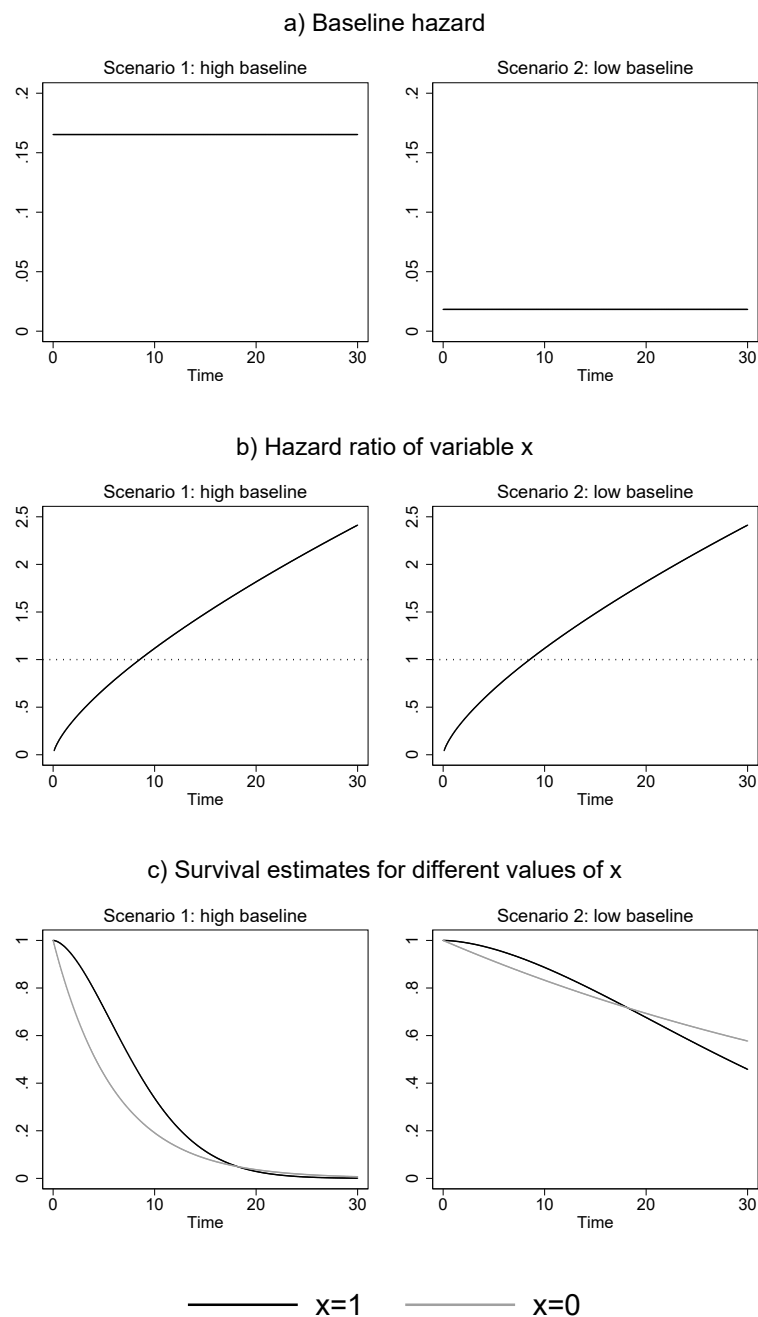


Figure 2: Analytically calculated survivor functions for data generating processes (9) - (12).

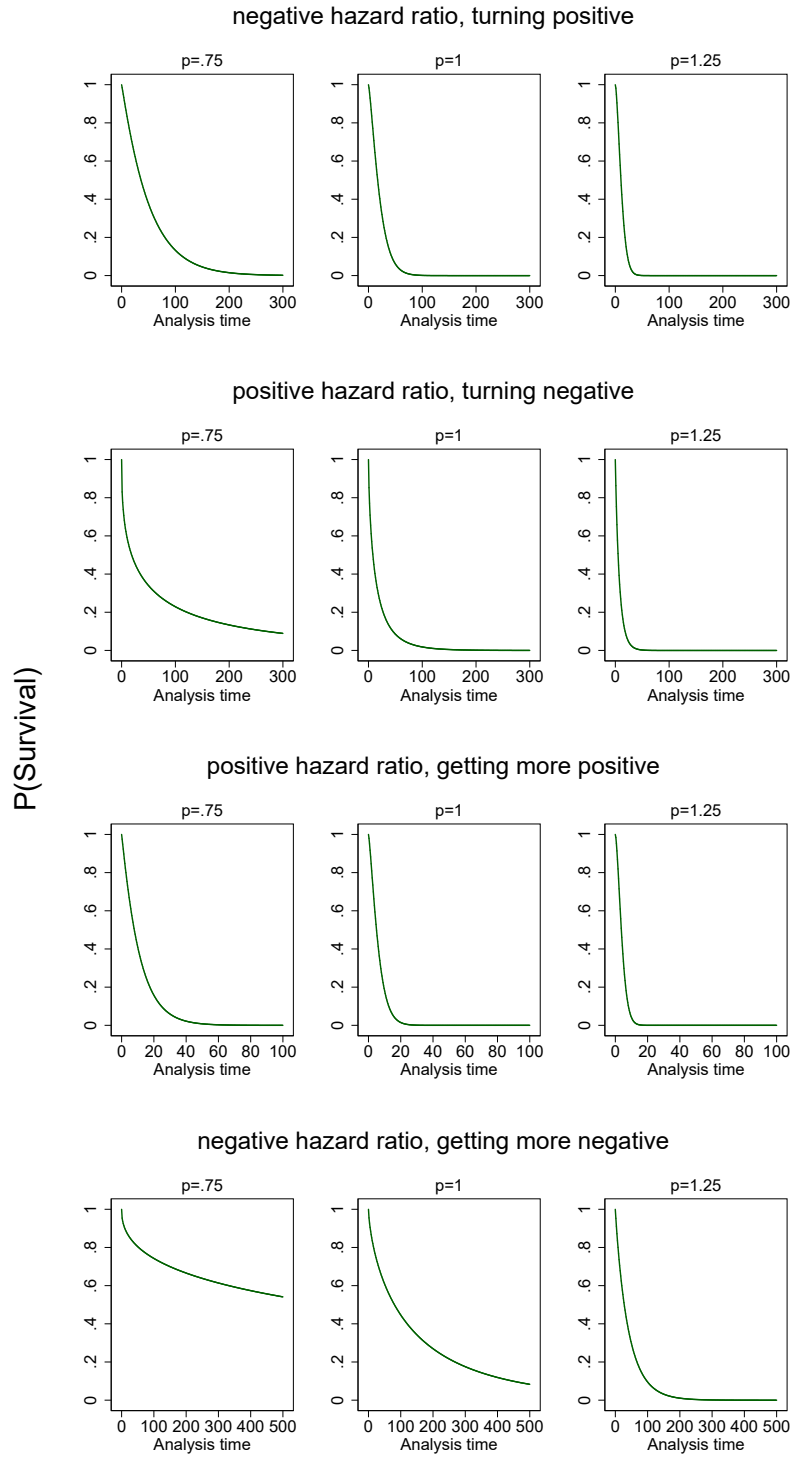


Figure 3: Monte Carlo Experiments with $N=200$: Distribution of the prediction error for data generating processes (9) - (12). Solid line gives estimated average based on local polynomial smoother. Dashed lines give 5th, 50th and 90th percentile of the error calculated in bins (width=1 analysis time unit). Based on 200 simulations per DGP.

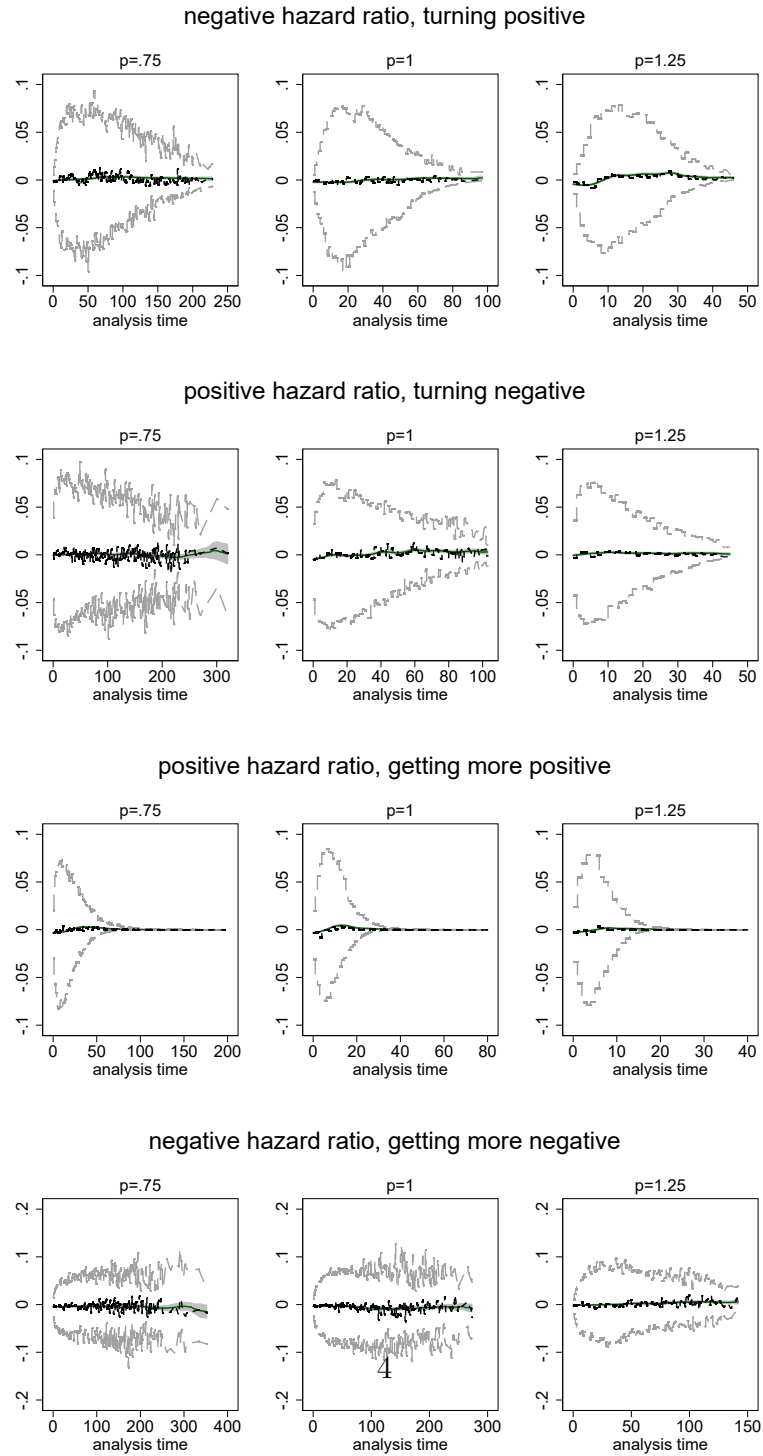


Figure 4: Monte Carlo Experiments with $N=50$: Distribution of the prediction error for data generating processes (9) - (12). Solid line gives estimated average based on local polynomial smoother. Dashed lines give 5th, 50th and 90th percentile of the error calculated in bins (width=1 analysis time unit). Based on 200 simulations per DGP.

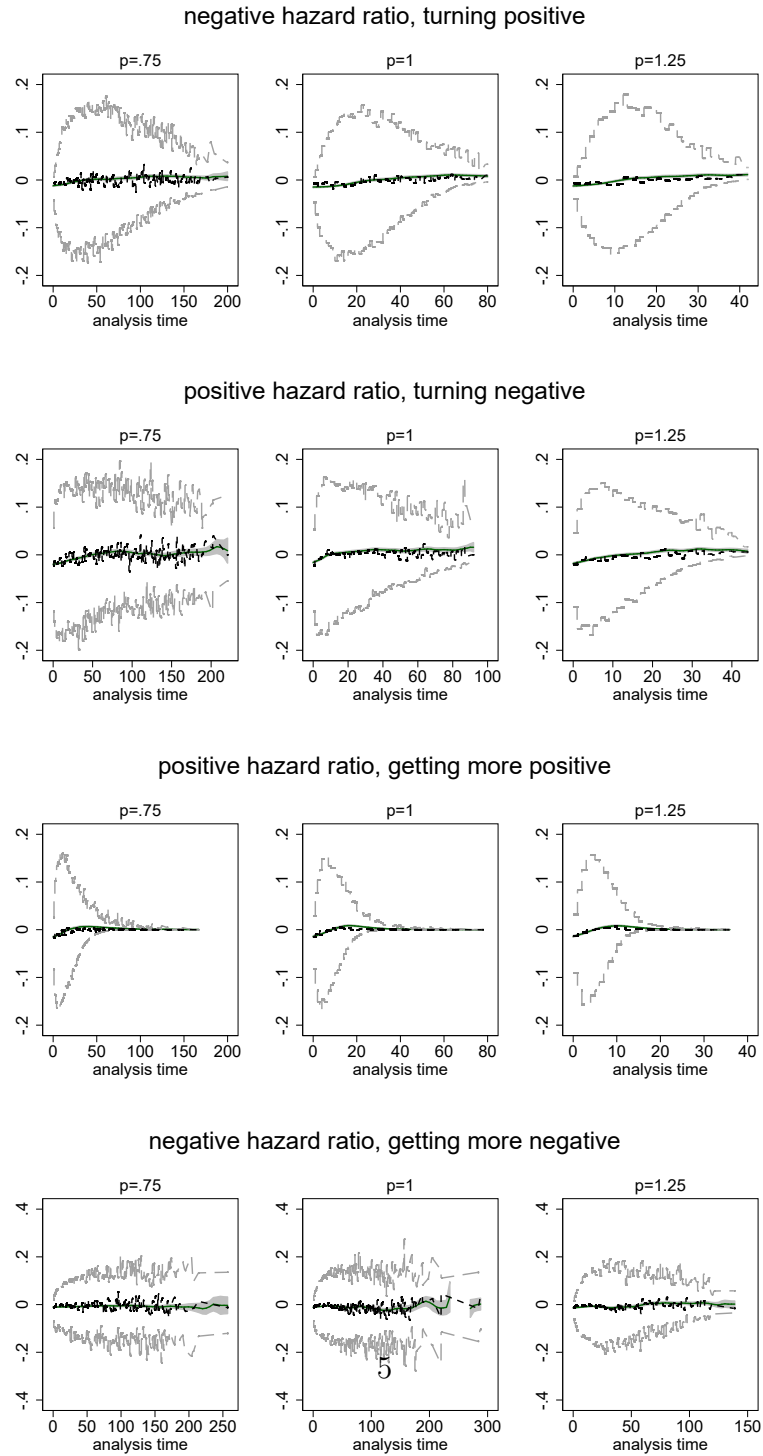


Figure 5: Difference in survival probability become insignificant after several years. Calculations based on restricted Cox model with 95% bootstrapped confidence intervals (1000 bootstrap samples).

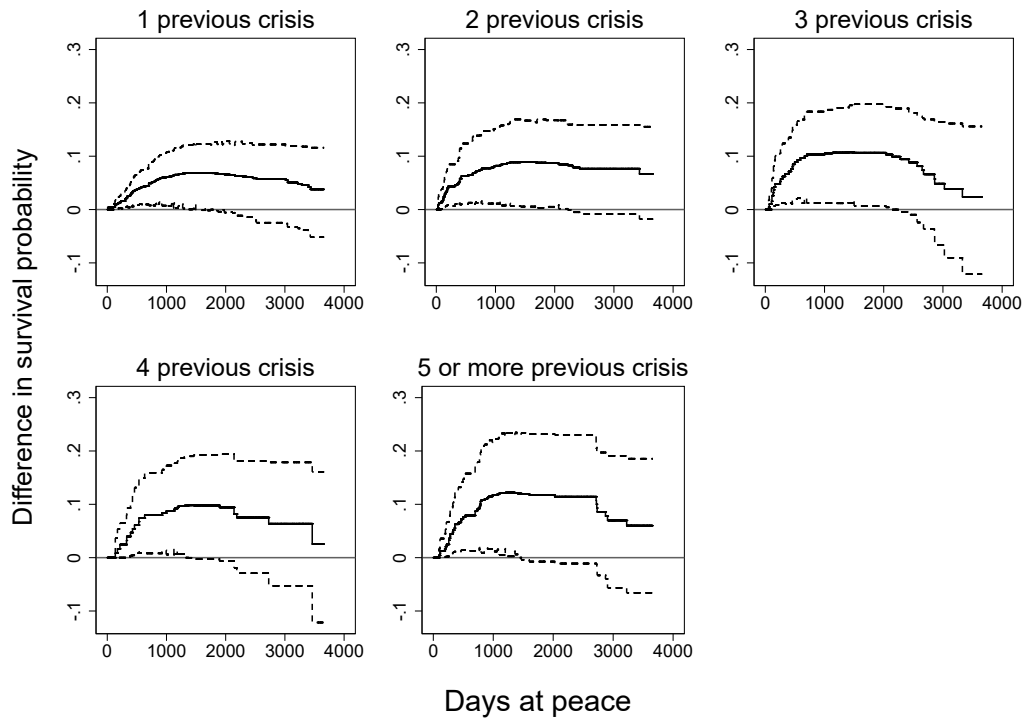


Figure 6: Discrete duration model with covariates, Probit link and cubic time polynomials leads to the same conclusions.

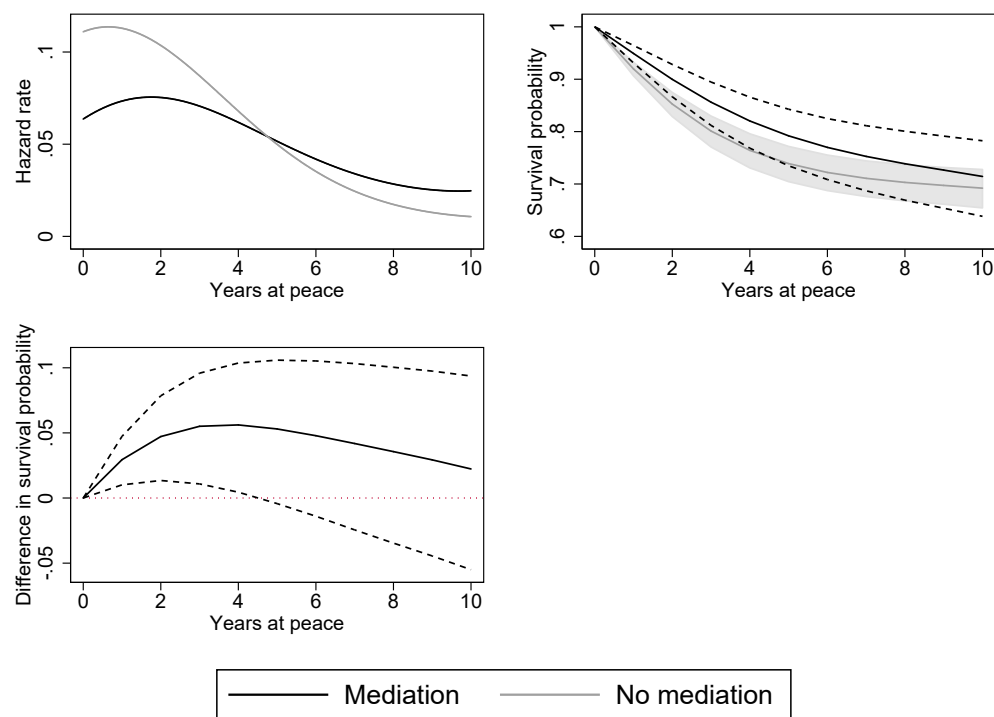


Table 1: Estimated coefficients for the replication of the restricted model Cox model using a discrete duration model.

	(1)
	Discrete duration model w/ covariates
newcrisis	
Mediation	-.303** (.116)
Mediation \times time	.0639* (.0251)
Previous crises	.146** (.0272)
Violence level	-.0863** (.0278)
Crisis duration	-.0386 (.0204)
Democratic dyad	-.252 (.166)
Victory	-.00352 (.0651)
Contiguity	.285** (.0729)
time	.0443 (.0785)
time ²	-.0364 (.0226)
time ³	.00212 (.00168)
Constant	-1.22** (.133)
Observations	4857

Probit link function, cluster robust standard errors in parentheses, * p < 0.05, ** p < 0.01

Table 2: The data can also be analyzed using Royston-Parmar models, which model a flexible baseline hazard and flexible time-varying coefficients using splines. The table provides the results for a Royston-Parmar model similar to the restricted Cox model in Table 1 of the paper.

	(1) original Cox	(2) restricted Cox	(3) Royston-Parmar
main			
Mediation	-.913** (.264)	-.681** (.218)	-.565** (.21)
Mediation spline			.439* (.214)
Mediation \times time	.000539* (.000212)	.000368** (.000138)	
Previous crises	.419** (.127)	.0582 (.063)	.0613 (.0666)
Violence level	.232 [†] (.136)	-.178** (.0563)	-.174** (.055)
Crisis duration	.302** (.0857)	-.0831* (.0399)	-.0826* (.0407)
Democratic dyad	-.605 (.626)	-.784* (.31)	-.8** (.301)
Victory	.607** (.209)	-.0212 (.123)	-.017 (.123)
Contiguity	1.24** (.342)	.559** (.148)	.566** (.139)
Previous crises \times time	-.000328** (.000105)		
Violence level \times time	-.000368** (.000102)		
Crisis duration \times time	-.000337** (.0000632)		
Democratic dyad \times time	-.0000461 (.000406)		
Victory \times time	-.000543** (.000152)		
Contiguity \times time	-.000589** (.000197)		
Constant			-1.64** (.328)
Observations	5128	134378	5128

cluster robust standard errors in parentheses, [†] $p < 0.1$, * $p < 0.05$, ** $p < 0.01$
restricted cubic splines modeling the baseline hazard not reported

Figure 7: When plotted over the figure reported in the paper, it becomes clear that the Royston-Parmar model (dashed lines) generates virtual identical predictions for the survival functions as the restricted Cox model.

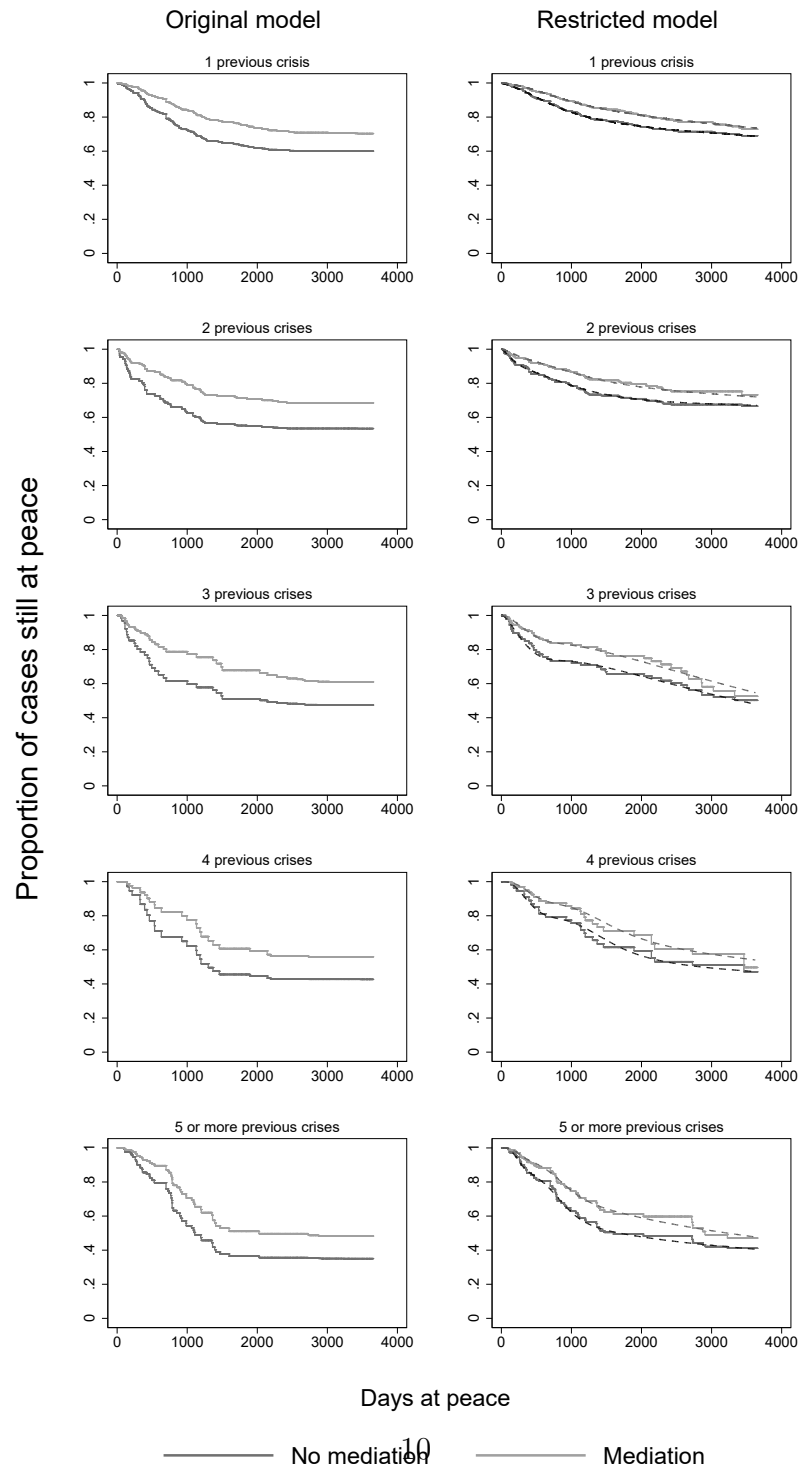


Figure 8: The Royston-Parmar model also confirms the difference in survival functions estimated with the Cox model.

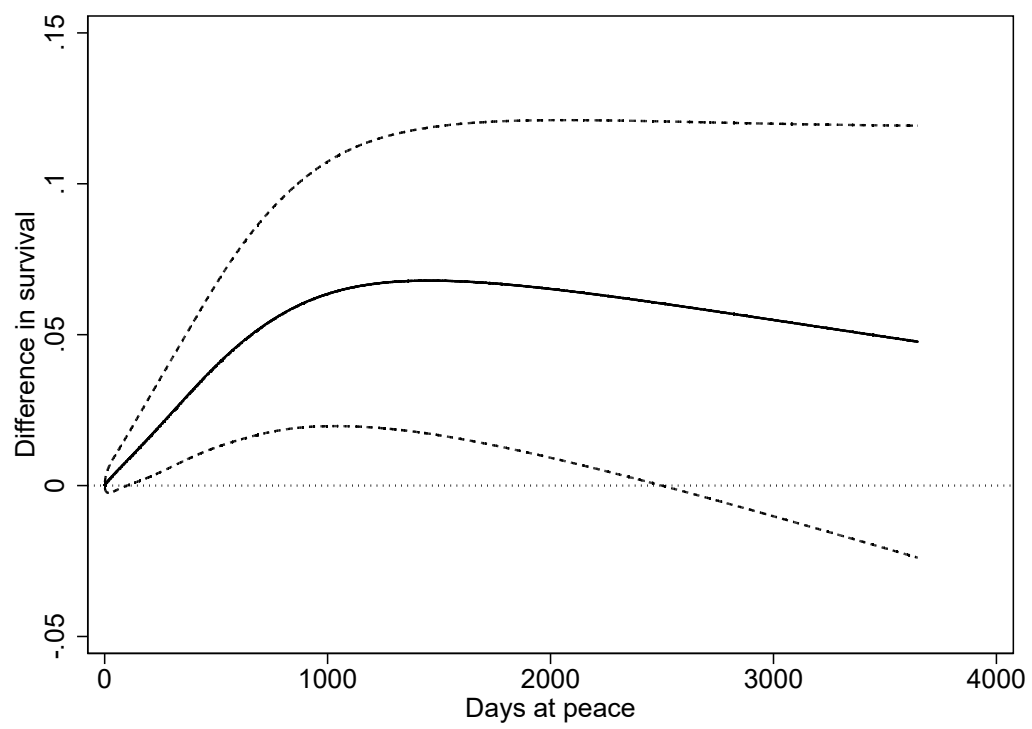


Figure 9: Time-varying covariates can be included in survival functions as well. Here, the survival curves are plotted as if mediation was a time-varying covariate and occurred after 1.5 years (547 days). PLEASE NOTE: Do NOT interpret this graph substantively. This is only an example which highlights that plotting time-varying covariates is generally possible. Mediation is NOT time-varying in the data, but rather determined at the outset of each spell. Thus, the survival prediction is purely hypothetical and an extrapolation from the model!!!.

