Supplementary Materials for "Marginal quantile regression for longitudinal data analysis in the presence of time-dependent covariates" by I-Chen Chen and Philip M. Westgate

We now present simulation results that supplement the results presented in the manuscript. In Tables S1-S4 we assess the validity of inference corresponding to the reference approach with an independence working structure and our proposed approach. We also present empirical coverage probabilities for N=500 to relate the validity of inference to sample size.

The empirical coverage probabilities (CPs) of 95% confidence intervals are similar for the reference approach and our proposed approach. The CPs are low for $N = 100$, but they improves as the number of subjects (N) increases. Furthermore, further work is needed in regard to improving the validity of inference for any sample size.

Table S1: Results for Cases 1-4 in which one Type I time-dependent covariate is incorporated.

			τ=0.10		τ=0.25		τ=0.50		τ=0.75		τ=0.90	
N	$Case$		EX	AR-1	EX	AR-1	EX	AR-1	EX	AR-1	EX	AR-1
100	(1)	CP_I	*0.917*	*0.917*	*0.911*	*0.911*	*0.928*	*0.928*	*0.922*	*0.922*	*0.905*	*0.905*
		CP_P	*0.912*	*0.901*	*0.912*	*0.911*	*0.910*	*0.889*	*0.905*	*0.922*	*0.906*	*0.896*
	(2)	CP_I	*0.889*	*0.889*	*0.929*	*0.929*	*0.934*	*0.934*	*0.927*	*0.927*	*0.903*	*0.903*
		CP_P	*0.911*	*0.904*	*0.909*	*0.928*	*0.916*	*0.901*	*0.916*	*0.908*	*0.906*	*0.902*
	(3)	CP_I	*0.906*	*0.906*	*0.909*	*0.909*	*0.904*	*0.904*	*0.907*	*0.907*	*0.883*	*0.883*
		CP_P	*0.902*	*0.901*	*0.902*	*0.909*	*0.906*	*0.905*	*0.915*	*0.900*	*0.892*	*0.882*
	(4)	CP_I	*0.915*	*0.915*	*0.914*	*0.914*	*0.933*	*0.933*	*0.922*	*0.922*	*0.907*	*0.907*
		CP_P	*0.917*	*0.914*	*0.892*	*0.886*	*0.913*	*0.892*	*0.920*	*0.909*	*0.906*	*0.909*
500	(1)	CP_I	*0.924*	*0.924*	*0.937*	*0.937*	*0.952*	*0.952*	*0.930*	*0.930*	*0.936*	*0.936*
		CP_P	*0.935*	*0.931*	*0.928*	*0.920*	*0.924*	*0.942*	*0.942*	*0.943*	*0.950*	*0.931*
	(2)	CP_I	*0.929*	*0.929*	*0.936*	*0.936*	*0.942*	*0.942*	*0.939*	*0.930*	*0.922*	*0.922*
		CP_P	*0.925*	*0.930*	*0.934*	*0.933*	*0.939*	*0.938*	*0.937*	*0.929*	*0.921*	*0.915*
	(3)	CP_I	*0.941*	*0.941*	*0.933*	*0.933*	*0.926*	*0.926*	*0.935*	*0.935*	*0.928*	*0.928*
		CP_P	*0.930*	*0.935*	*0.925*	*0.922*	*0.943*	*0.932*	*0.933*	*0.939*	*0.929*	*0.927*
	(4)	CP_I	*0.923*	*0.923*	*0.940*	*0.940*	*0.963*	*0.963*	*0.934*	*0.934*	*0.940*	*0.940*
		CP_P	*0.926*	*0.929*	*0.943*	*0.929*	*0.937*	*0.927*	*0.934*	*0.933*	*0.935*	*0.943*

τ - quantile level; EX - exchangeable; AR-1 - first-order autoregressive;
CP_I - empirical coverage probability of 95% confidence intervals covering β_1 of the approach with an independence structure;
CP_P - empirical coverage probability of 95% confidence intervals covering β_1 of the proposed approach.

Table S2: Results for Cases 1-4 in which one Type II time-dependent covariate is incorporated.

			τ=0.10		τ=0.25		τ=0.50		τ=0.75		τ=0.90	
N	*Case*		*EX*	*AR*-1	*EX*	*AR*-1	*EX*	*AR*-1	*EX*	*AR*-1	*EX*	*AR*-1
100	(1)	CP_I	*0.925*	*0.925*	*0.921*	*0.921*	*0.931*	*0.931*	*0.916*	*0.916*	*0.910*	*0.910*
		CP_P	*0.925*	*0.930*	*0.931*	*0.924*	*0.930*	*0.929*	*0.917*	*0.916*	*0.917*	*0.921*
	(2)	CP_I	*0.915*	*0.915*	*0.928*	*0.928*	*0.925*	*0.925*	*0.909*	*0.909*	*0.916*	*0.916*
		CP_P	*0.918*	*0.921*	*0.928*	*0.927*	*0.929*	*0.933*	*0.915*	*0.910*	*0.928*	*0.923*
	(3)	CP_I	*0.934*	*0.934*	*0.912*	*0.912*	*0.912*	*0.912*	*0.928*	*0.928*	*0.881*	*0.881*
		CP_P	*0.934*	*0.931*	*0.923*	*0.919*	*0.920*	*0.918*	*0.930*	*0.939*	*0.906*	*0.906*
	(4)	CP_I	*0.909*	*0.909*	*0.918*	*0.918*	*0.933*	*0.933*	*0.943*	*0.943*	*0.915*	*0.915*
		CP_P	*0.914*	*0.910*	*0.919*	*0.916*	*0.936*	*0.939*	*0.945*	*0.951*	*0.925*	*0.924*
500	(1)	CP_I	*0.933*	*0.933*	*0.929*	*0.929*	*0.938*	*0.938*	*0.936*	*0.936*	*0.944*	*0.944*
		CP_P	*0.927*	*0.934*	*0.930*	*0.930*	*0.933*	*0.931*	*0.934*	*0.938*	*0.937*	*0.931*
	(2)	CP_I	*0.943*	*0.943*	*0.939*	*0.939*	*0.940*	*0.940*	*0.940*	*0.940*	*0.939*	*0.939*
		CP_P	*0.946*	*0.944*	*0.931*	*0.931*	*0.947*	*0.946*	*0.943*	*0.939*	*0.938*	*0.938*
	(3)	CP_I	*0.946*	*0.946*	*0.939*	*0.939*	*0.922*	*0.922*	*0.932*	*0.932*	*0.919*	*0.919*
		CP_P	*0.949*	*0.953*	*0.946*	*0.947*	*0.934*	*0.936*	*0.938*	*0.937*	*0.926*	*0.924*
	(4)	CP_I	*0.934*	*0.934*	*0.928*	*0.928*	*0.955*	*0.955*	*0.941*	*0.941*	*0.943*	*0.943*
		CP_P	*0.933*	*0.937*	*0.931*	*0.933*	*0.953*	*0.952*	*0.948*	*0.941*	*0.943*	*0.941*

τ - quantile level; EX - exchangeable; AR-1 - first-order autoregressive;
CP_I - empirical coverage probability of 95% confidence intervals covering β_1 of the approach with an independence structure;
CP_P - empirical coverage probability of 95% confidence intervals covering β_1 of the proposed approach.

Table S3: Results for Cases 1-4 in which one Type III time-dependent covariate is incorporated.

			τ=0.10		τ=0.25		τ=0.50		τ=0.75		τ=0.90	
N	*Case*		*EX*	*AR*-1	*EX*	*AR*-1	*EX*	*AR*-1	*EX*	*AR*-1	*EX*	*AR*-1
100	(1)	CP_I	*0.879*	*0.879*	*0.926*	*0.926*	*0.928*	*0.928*	*0.904*	*0.904*	*0.887*	*0.887*
		CP_P	*0.886*	*0.890*	*0.936*	*0.936*	*0.933*	*0.935*	*0.914*	*0.913*	*0.901*	*0.902*
	(2)	CP_I	*0.895*	*0.895*	*0.918*	*0.918*	*0.913*	*0.913*	*0.906*	*0.906*	*0.893*	*0.893*
		CP_P	*0.907*	*0.909*	*0.922*	*0.926*	*0.917*	*0.920*	*0.912*	*0.912*	*0.902*	*0.905*
	(3)	CP_I	*0.890*	*0.890*	*0.901*	*0.901*	*0.917*	*0.917*	*0.901*	*0.901*	*0.855*	*0.855*
		CP_P	*0.893*	*0.895*	*0.915*	*0.917*	*0.914*	*0.917*	*0.908*	*0.909*	*0.873*	*0.875*
	(4)	CP_I	*0.881*	*0.881*	*0.915*	*0.915*	*0.931*	*0.931*	*0.915*	*0.915*	*0.899*	*0.899*
		CP_P	*0.889*	*0.890*	*0.918*	*0.916*	*0.938*	*0.936*	*0.923*	*0.925*	*0.910*	*0.908*
500	(1)	CP_I	*0.909*	*0.909*	*0.907*	*0.907*	*0.909*	*0.909*	*0.903*	*0.903*	*0.899*	*0.899*
		CP_P	*0.912*	*0.918*	*0.908*	*0.911*	*0.908*	*0.916*	*0.906*	*0.912*	*0.903*	*0.900*
	(2)	CP_I	*0.911*	*0.911*	*0.927*	*0.927*	*0.920*	*0.920*	*0.923*	*0.923*	*0.908*	*0.908*
		CP_P	*0.916*	*0.914*	*0.933*	*0.938*	*0.920*	*0.926*	*0.928*	*0.931*	*0.911*	*0.911*
	(3)	CP_I	*0.846*	*0.846*	*0.867*	*0.867*	*0.903*	*0.903*	*0.922*	*0.922*	*0.929*	*0.929*
		CP_P	*0.849*	*0.853*	*0.865*	*0.873*	*0.906*	*0.910*	*0.928*	*0.932*	*0.932*	*0.932*
	(4)	CP_I	*0.918*	*0.918*	*0.911*	*0.911*	*0.890*	*0.890*	*0.939*	*0.939*	*0.927*	*0.927*
		CP_P	*0.918*	*0.919*	*0.913*	*0.913*	*0.894*	*0.891*	*0.937*	*0.938*	*0.932*	*0.932*

τ - quantile level; EX - exchangeable; AR-1 - first-order autoregressive;
CP_I - empirical coverage probability of 95% confidence intervals covering β_1 of the approach with an independence structure;
CP_P - empirical coverage probability of 95% confidence intervals covering β_1 of the proposed approach.

Table S4: Results for Cases 1-4 in which one time-independent, one Type I, and one Type II time-dependent covariates are incorporated. Only results corresponding to the Type II covariate are shown.

			τ=0.10		τ=0.25		τ=0.50		τ=0.75		τ=0.90	
N	$Case$		EX	AR-1	EX	AR-1	EX	AR-1	EX	AR-1	EX	AR-1
100	(1)	CP_I	*0.899*	*0.899*	*0.925*	*0.925*	*0.924*	*0.924*	*0.911*	*0.911*	*0.888*	*0.888*
		CP_P	*0.908*	*0.917*	*0.938*	*0.939*	*0.936*	*0.938*	*0.925*	*0.925*	*0.910*	*0.907*
	(2)	CP_I	*0.915*	*0.915*	*0.923*	*0.923*	*0.931*	*0.931*	*0.928*	*0.928*	*0.900*	*0.900*
		CP_P	*0.927*	*0.929*	*0.926*	*0.928*	*0.943*	*0.942*	*0.928*	*0.934*	*0.917*	*0.920*
	(3)	CP_I	*0.894*	*0.894*	*0.921*	*0.921*	*0.924*	*0.924*	*0.917*	*0.917*	*0.887*	*0.887*
		CP_P	*0.918*	*0.913*	*0.942*	*0.948*	*0.938*	*0.940*	*0.936*	*0.930*	*0.906*	*0.911*
	(4)	CP_I	*0.905*	*0.905*	*0.918*	*0.918*	*0.930*	*0.930*	*0.913*	*0.913*	*0.894*	*0.894*
		CP_P	*0.924*	*0.920*	*0.932*	*0.930*	*0.940*	*0.942*	*0.931*	*0.928*	*0.920*	*0.914*
500	(1)	CP_I	*0.930*	*0.930*	*0.938*	*0.938*	*0.940*	*0.940*	*0.944*	*0.944*	*0.936*	*0.936*
		CP_P	*0.949*	*0.938*	*0.945*	*0.940*	*0.945*	*0.938*	*0.941*	*0.936*	*0.946*	*0.947*
	(2)	CP_I	*0.925*	*0.925*	*0.949*	*0.949*	*0.926*	*0.926*	*0.949*	*0.949*	*0.921*	*0.921*
		CP_P	*0.938*	*0.936*	*0.945*	*0.954*	*0.931*	*0.935*	*0.952*	*0.958*	*0.933*	*0.934*
	(3)	CP_I	*0.935*	*0.935*	*0.947*	*0.947*	*0.937*	*0.937*	*0.949*	*0.949*	*0.935*	*0.935*
		CP_P	*0.938*	*0.940*	*0.950*	*0.949*	*0.933*	*0.937*	*0.947*	*0.947*	*0.942*	*0.946*
	(4)	CP_I	*0.937*	*0.937*	*0.935*	*0.935*	*0.919*	*0.919*	*0.934*	*0.934*	*0.931*	*0.931*
		CP_P	*0.940*	*0.941*	*0.943*	*0.943*	*0.927*	*0.922*	*0.939*	*0.934*	*0.944*	*0.940*

τ - quantile level; EX - exchangeable; AR-1 - first-order autoregressive;
CP_I - empirical coverage probability of 95% confidence intervals covering β_1 of the approach with an independence structure;
CP_P - empirical coverage probability of 95% confidence intervals covering β_1 of the proposed approach.

Table S5: Results for Cases 1-4 in which one Type I time-dependent covariate is incorporated ($N = 500$).

		τ=0.10		τ=0.25		τ=0.50		τ=0.75		τ=0.90	
		EX	*AR*-1	*EX*	*AR*-1	*EX*	*AR*-1	*EX*	*AR*-1	*EX*	*AR*-1
	$Bias_I$	*-.0001*	*-.0001*	*-.0006*	*-.0006*	*.0014*	*.0014*	*-.0030*	*-.0030*	*-.0001*	*-.0001*
	$Bias_P$	*.0001*	*.0004*	*-.0003*	*-.0004*	*.0013*	*.0008*	*-.0021*	*-.0028*	*.0010*	*.0006*
	MSE_P	*.0018*	*.0018*	*.0016*	*.0016*	*.0013*	*.0013*	*.0016*	*.0016*	*.0017*	*.0017*
Case	*RE*	*1.239*	*1.271*	*1.201*	*1.211*	*1.161*	*1.214*	*1.222*	*1.217*	*1.224*	*1.220*
(1)	$Power_I$	*0.997*	*0.997*	*0.999*	*0.999*	*0.999*	*0.999*	*0.996*	*0.996*	*0.993*	*0.993*
	$Power_P$	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*
	Type I	643	682	578	587	558	568	577	582	639	649
	Type II	252	235	288	315	289	321	288	311	265	262
	Type III	105	83	134	98	153	111	135	107	96	89
	$Bias_I$	*.0014*	*.0014*	*-.0017*	*-.0017*	*-.0001*	*-.0001*	*-.0023*	*-.0023*	*-.0026*	*-.0026*
	$Bias_P$	*.0006*	*.0006*	*-.0011*	*-.0013*	*-.0001*	*-.0002*	*-.0019*	*-.0023*	*-.0018*	*-.0019*
	MSE_P	*.0029*	*.0028*	*.0018*	*.0018*	*.0017*	*.0017*	*.0021*	*.0021*	*.0032*	*.0031*
Case	*RE*	*1.205*	*1.210*	*1.223*	*1.213*	*1.190*	*1.196*	*1.195*	*1.203*	*1.200*	*1.241*
(2)	$Power_I$	*0.950*	*0.950*	*0.993*	*0.993*	*0.998*	*0.998*	*0.995*	*0.995*	*0.961*	*0.961*
	$Power_P$	*0.994*	*0.998*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*0.998*	*0.998*
	Type I	595	651	585	576	555	547	556	596	628	648
	Type II	265	240	297	326	289	341	288	292	242	263
	Type III	140	109	118	98	156	112	156	112	130	89
	$Bias_I$	*-.0008*	*-.0008*	*-.0020*	*-.0020*	*-.0005*	*-.0005*	*-.0015*	*-.0015*	*.0053*	*.0053*
	$Bias_P$	*-.0001*	*-.0003*	*-.0018*	*-.0017*	*-.0001*	*-.0005*	*-.0016*	*-.0011*	*.0052*	*.0053*
	MSE_P	*.0014*	*.0014*	*.0013*	*.0014*	*.0014*	*.0013*	*.0024*	*.0023*	*.0094*	*.0092*
Case	*RE*	*1.309*	*1.306*	*1.236*	*1.195*	*1.209*	*1.226*	*1.193*	*1.213*	*1.103*	*1.124*
(3)	$Power_I$	*0.998*	*0.998*	*0.999*	*0.999*	*0.999*	*0.999*	*0.982*	*0.982*	*0.635*	*0.635*
	$Power_P$	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*0.999*	*0.999*	*0.748*	*0.760*
	Type I	660	651	566	545	558	548	582	591	549	596
	Type II	240	275	302	345	306	339	274	304	276	269
	Type III	100	74	132	110	136	113	144	105	175	135
	$Bias_I$	*-.0007*	*-.0007*	*-.0004*	*-.0004*	*-.0001*	*-.0001*	*.0018*	*.0018*	*-.0010*	*-.0010*
	$Bias_P$	*.0002*	*-.0003*	*-.0008*	*-.0006*	*-.0005*	*.0003*	*.0016*	*.0021*	*-.0004*	*-.0002*
	MSE_P	*.0015*	*.0014*	*.0012*	*.0011*	*.0011*	*.0011*	*.0011*	*.0011*	*.0013*	*.0013*
Case	*RE*	*1.244*	*1.271*	*1.211*	*1.289*	*1.248*	*1.255*	*1.194*	*1.270*	*1.189*	*1.231*
(4)	$Power_I$	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*0.998*	*0.998*
	$Power_P$	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*
	Type I	517	487	510	514	504	473	555	493	564	543
	Type II	319	400	312	384	341	411	277	401	286	352
	Type III	164	113	178	102	155	116	168	106	150	105

τ - quantile level; EX - exchangeable; AR-1 - first-order autoregressive;
$Bias_I$ and $Bias_P$ - empirical biases of the method with an independence structure and the proposed method;
MSE_P - empirical mean squared error (MSE) of the proposed approach;
RE - relative efficiency or ratio of the empirical MSE from the estimation method with an independence structure to the MSE from the proposed method;
$Power_I$ and $Power_P$ - empirical powers of the reference approach and the proposed approach, respectively;
Types I-III - the number of times out of 1,000 simulations that the given covariate type was selected.

Table S6: Results for Cases 1-4 in which one Type II time-dependent covariate is incorporated ($N = 500$).

		τ=0.10		τ=0.25		τ=0.50		τ=0.75		τ=0.90	
		EX	*AR*-1	*EX*	*AR*-1	*EX*	*AR*-1	*EX*	*AR*-1	*EX*	*AR*-1
	$Bias_I$	*.0014*	*.0014*	*-.0017*	*-.0017*	*.0014*	*.0014*	*-.0039*	*-.0039*	*-.0003*	*-.0003*
	$Bias_P$	*.0015*	*.0016*	*-.0022*	*-.0016*	*.0011*	*.0013*	*-.0035*	*-.0032*	*-.0006*	*-.0001*
	MSE_P	*.0026*	*.0027*	*.0022*	*.0022*	*.0019*	*.0018*	*.0022*	*.0021*	*.0026*	*.0026*
Case	*RE*	*1.111*	*1.097*	*1.087*	*1.080*	*1.064*	*1.071*	*1.076*	*1.095*	*1.101*	*1.098*
(1)	$Power_I$	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*
	$Power_P$	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*
	Type I	0	0	0	0	0	0	0	0	0	0
	Type II	837	863	771	810	742	786	781	819	839	874
	Type III	163	137	229	190	258	214	219	181	161	126
	$Bias_I$	*-.0003*	*-.0003*	*-.0025*	*-.0025*	*-.0002*	*-.0002*	*-.0036*	*-.0036*	*-.0017*	*-.0017*
	$Bias_P$	*-.0008*	*.0001*	*-.0025*	*-.0022*	*-.0004*	*.0002*	*-.0032*	*-.0034*	*-.0018*	*-.0016*
	MSE_P	*.0035*	*.0034*	*.0025*	*.0025*	*.0024*	*.0024*	*.0025*	*.0025*	*.0033*	*.0034*
Case	*RE*	*1.099*	*1.110*	*1.098*	*1.102*	*1.077*	*1.052*	*1.107*	*1.094*	*1.109*	*1.094*
(2)	$Power_I$	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*0.999*	*0.999*
	$Power_P$	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*
	Type I	0	0	0	0	0	0	0	0	0	0
	Type II	799	858	804	855	718	769	758	830	814	849
	Type III	201	142	196	145	282	231	242	170	186	151
	$Bias_I$	*-.0034*	*-.0034*	*-.0023*	*-.0023*	*-.0018*	*-.0018*	*-.0003*	*-.0003*	*.0035*	*.0035*
	$Bias_P$	*-.0036*	*-.0033*	*-.0017*	*-.0018*	*-.0019*	*-.0019*	*-.0005*	*-.0004*	*.0041*	*.0042*
	MSE_P	*.0024*	*.0025*	*.0020*	*.0020*	*.0021*	*.0022*	*.0028*	*.0028*	*.0073*	*.0072*
Case	*RE*	*1.124*	*1.113*	*1.107*	*1.091*	*1.068*	*1.045*	*1.075*	*1.087*	*1.077*	*1.090*
(3)	$Power_I$	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*0.890*	*0.890*
	$Power_P$	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*0.937*	*0.937*
	Type I	0	0	0	0	0	0	0	0	2	0
	Type II	855	911	794	820	721	767	753	824	752	760
	Type III	145	89	206	180	279	233	247	176	246	240
	$Bias_I$	*-.0015*	*-.0015*	*-.0006*	*-.0006*	*-.0018*	*-.0018*	*.0025*	*.0025*	*-.0015*	*-.0015*
	$Bias_P$	*-.0014*	*-.0014*	*-.0006*	*.0002*	*-.0014*	*-.0015*	*.0020*	*.0026*	*-.0015*	*-.0011*
	MSE_P	*.0021*	*.0021*	*.0018*	*.0018*	*.0016*	*.0016*	*.0017*	*.0017*	*.0020*	*.0021*
Case	*RE*	*1.134*	*1.120*	*1.089*	*1.104*	*1.065*	*1.057*	*1.083*	*1.088*	*1.130*	*1.117*
(4)	$Power_I$	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*
	$Power_P$	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*
	Type I	0	0	0	0	0	0	0	0	0	0
	Type II	834	891	787	852	734	784	815	858	814	885
	Type III	166	109	213	148	266	216	185	142	186	115

τ - quantile level; EX - exchangeable; AR-1 - first-order autoregressive;
$Bias_I$ and $Bias_P$ - empirical biases of the method with an independence structure and the proposed method;
MSE_P - empirical mean squared error (MSE) of the proposed approach;
RE - relative efficiency or ratio of the empirical MSE from the estimation method with an independence structure to the MSE from the proposed method;
$Power_I$ and $Power_P$ - empirical powers of the reference approach and the proposed approach, respectively;
Types I-III - the number of times out of 1,000 simulations that the given covariate type was selected.

Table S7: Results for Cases 1-4 in which one Type III time-dependent covariate is incorporated ($N = 500$).

		τ=0.10		τ=0.25		τ=0.50		τ=0.75		τ=0.90	
		EX	*AR*-1	*EX*	*AR*-1	*EX*	*AR*-1	*EX*	*AR*-1	*EX*	*AR*-1
	$Bias_I$	*.0131*	*.0131*	*.0162*	*.0162*	*.0181*	*.0181*	*.0158*	*.0158*	*.0130*	*.0130*
	$Bias_P$	*.0129*	*.0125*	*.0160*	*.0156*	*.0176*	*.0174*	*.0154*	*.0150*	*.0128*	*.0124*
	MSE_P	*.0005*	*.0005*	*.0005*	*.0005*	*.0005*	*.0005*	*.0005*	*.0005*	*.0005*	*.0005*
Case	*RE*	*1.018*	*1.035*	*1.023*	*1.045*	*1.035*	*1.047*	*1.040*	*1.064*	*1.034*	*1.045*
(1)	$Power_I$	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*
	$Power_P$	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*
	Type I	6	6	2	13	5	16	7	20	9	10
	Type II	5	121	10	56	19	33	11	58	4	122
	Type III	989	873	988	931	976	951	982	922	987	868
	$Bias_I$	*.0107*	*.0107*	*.0150*	*.0150*	*.0189*	*.0189*	*.0159*	*.0159*	*.0093*	*.0093*
	$Bias_P$	*.0106*	*.0098*	*.0148*	*.0145*	*.0187*	*.0182*	*.0157*	*.0154*	*.0094*	*.0086*
	MSE_P	*.0007*	*.0007*	*.0006*	*.0006*	*.0006*	*.0006*	*.0006*	*.0006*	*.0006*	*.0006*
Case	*RE*	*1.039*	*1.048*	*1.021*	*1.034*	*1.025*	*1.049*	*1.024*	*1.034*	*1.024*	*1.032*
(2)	$Power_I$	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*
	$Power_P$	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*
	Type I	0	1	3	4	0	11	2	2	0	2
	Type II	11	144	8	29	12	12	3	35	15	142
	Type III	989	855	989	967	988	977	995	963	985	856
	$Bias_I$	*.0213*	*.0213*	*.0218*	*.0218*	*.0195*	*.0195*	*.0124*	*.0124*	*.0076*	*.0076*
	$Bias_P$	*.0208*	*.0207*	*.0213*	*.0212*	*.0193*	*.0190*	*.0124*	*.0117*	*.0066*	*.0055*
	MSE_P	*.0007*	*.0007*	*.0007*	*.0007*	*.0006*	*.0006*	*.0006*	*.0006*	*.0016*	*.0016*
Case	*RE*	*1.032*	*1.040*	*1.043*	*1.046*	*1.023*	*1.043*	*1.017*	*1.028*	*1.028*	*1.028*
(3)	$Power_I$	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*
	$Power_P$	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*
	Type I	7	12	7	17	2	8	1	6	0	0
	Type II	9	53	15	76	10	37	4	37	119	235
	Type III	984	935	978	907	988	955	995	957	881	765
	$Bias_I$	*.0134*	*.0134*	*.0158*	*.0158*	*.0178*	*.0178*	*.0159*	*.0159*	*.0130*	*.0130*
	$Bias_P$	*.0135*	*.0130*	*.0157*	*.0152*	*.0178*	*.0173*	*.0159*	*.0155*	*.0130*	*.0125*
	MSE_P	*.0007*	*.0007*	*.0007*	*.0006*	*.0007*	*.0007*	*.0006*	*.0006*	*.0007*	*.0007*
Case	*RE*	*1.013*	*1.028*	*1.031*	*1.048*	*1.023*	*1.042*	*1.023*	*1.030*	*1.018*	*1.032*
(4)	$Power_I$	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*
	$Power_P$	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*
	Type I	0	2	2	7	0	4	2	4	2	2
	Type II	1	83	4	91	1	116	3	85	3	98
	Type III	999	915	994	902	999	880	995	911	995	900

τ - quantile level; EX - exchangeable; AR-1 - first-order autoregressive;
$Bias_I$ and $Bias_P$ - empirical biases of the method with an independence structure and the proposed method;
MSE_P - empirical mean squared error (MSE) of the proposed approach;
RE - relative efficiency or ratio of the empirical MSE from the estimation method with an independence structure to the MSE from the proposed method;
$Power_I$ and $Power_P$ - empirical powers of the reference approach and the proposed approach, respectively;
Types I-III - the number of times out of 1,000 simulations that the given covariate type was selected.

Table S8: Results for Cases 1-4 in which one time-independent, one Type I, and one Type II time-dependent covariates are incorporated. Only results corresponding to the Type II covariate are shown ($N = 500$).

		τ=0.10		τ=0.25		τ=0.50		τ=0.75		τ=0.90	
		EX	*AR*-1	*EX*	*AR*-1	*EX*	*AR*-1	*EX*	*AR*-1	*EX*	*AR*-1
	$Bias_I$	*-.0010*	*-.0010*	*-.0013*	*-.0013*	*-.0010*	*-.0010*	*.0026*	*.0026*	*.0021*	*.0021*
	$Bias_P$	*.0001*	*.0000*	*-.0015*	*-.0010*	*-.0015*	*-.0012*	*.0020*	*.0023*	*.0025*	*.0025*
	MSE_P	*.0030*	*.0031*	*.0022*	*.0022*	*.0019*	*.0019*	*.0022*	*.0022*	*.0030*	*.0030*
Case	*RE*	*1.144*	*1.115*	*1.097*	*1.069*	*1.078*	*1.077*	*1.098*	*1.081*	*1.127*	*1.112*
(1)	$Power_I$	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*
	$Power_P$	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*
	Type I	0	0	0	0	0	0	0	0	0	0
	Type II	669	751	738	808	749	806	744	784	667	734
	Type III	331	249	262	192	251	194	256	216	333	266
	$Bias_I$	*-.0012*	*-.0012*	*-.0008*	*-.0008*	*-.0008*	*-.0008*	*.0010*	*.0010*	*-.0031*	*-.0031*
	$Bias_P$	*-.0009*	*-.0006*	*-.0003*	*.0002*	*-.0007*	*-.0004*	*.0007*	*.0007*	*-.0032*	*-.0024*
	MSE_P	*.0045*	*.0046*	*.0026*	*.0026*	*.0025*	*.0025*	*.0026*	*.0026*	*.0048*	*.0051*
Case	*RE*	*1.148*	*1.114*	*1.086*	*1.082*	*1.080*	*1.071*	*1.114*	*1.116*	*1.161*	*1.097*
(2)	$Power_I$	*0.996*	*0.996*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*0.996*	*0.996*
	$Power_P$	*0.998*	*0.998*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*
	Type I	0	0	0	0	0	0	0	0	0	0
	Type II	701	756	754	784	735	802	725	806	666	742
	Type III	299	244	246	216	265	198	275	194	334	258
	$Bias_I$	*-.0007*	*-.0007*	*.0002*	*.0002*	*-.0019*	*-.0019*	*-.0008*	*-.0008*	*-.0036*	*-.0036*
	$Bias_P$	*-.0016*	*-.0007*	*-.0000*	*.0002*	*-.0025*	*-.0021*	*-.0011*	*-.0008*	*-.0032*	*-.0021*
	MSE_P	*.0026*	*.0027*	*.0020*	*.0020*	*.0022*	*.0022*	*.0035*	*.0036*	*.0106*	*.0108*
Case	*RE*	*1.095*	*1.076*	*1.087*	*1.089*	*1.120*	*1.101*	*1.085*	*1.061*	*1.137*	*1.124*
(3)	$Power_I$	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*0.853*	*0.853*
	$Power_P$	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*0.892*	*0.892*
	Type I	0	0	0	0	0	0	0	0	9	0
	Type II	686	729	724	792	721	793	701	766	606	703
	Type III	314	271	276	208	279	207	299	234	385	297
	$Bias_I$	*-.0016*	*-.0016*	*.0004*	*.0004*	*-.0016*	*-.0016*	*-.0021*	*-.0021*	*.0013*	*.0013*
	$Bias_P$	*-.0015*	*-.0010*	*.0003*	*.0008*	*-.0014*	*-.0015*	*-.0024*	*-.0019*	*.0020*	*.0023*
	MSE_P	*.0028*	*.0028*	*.0021*	*.0021*	*.0021*	*.0021*	*.0022*	*.0022*	*.0028*	*.0029*
Case	*RE*	*1.056*	*1.066*	*1.069*	*1.072*	*1.093*	*1.084*	*1.072*	*1.064*	*1.165*	*1.111*
(4)	$Power_I$	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*
	$Power_P$	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*
	Type I	0	0	0	0	0	0	0	0	0	0
	Type II	666	701	721	770	721	775	729	766	654	693
	Type III	334	299	279	230	279	225	271	234	346	307

τ - quantile level; EX - exchangeable; AR-1 - first-order autoregressive;
$Bias_I$ and $Bias_P$ - empirical biases of the method with an independence structure and the proposed method;
MSE_P - empirical mean squared error (MSE) of the proposed approach;
RE - relative efficiency or ratio of the empirical MSE from the estimation method with an independence structure to the MSE from the proposed method;
$Power_I$ and $Power_P$ - empirical powers of the reference approach and the proposed approach, respectively;
Types I-III - the number of times out of 1,000 simulations that the given covariate type was selected.