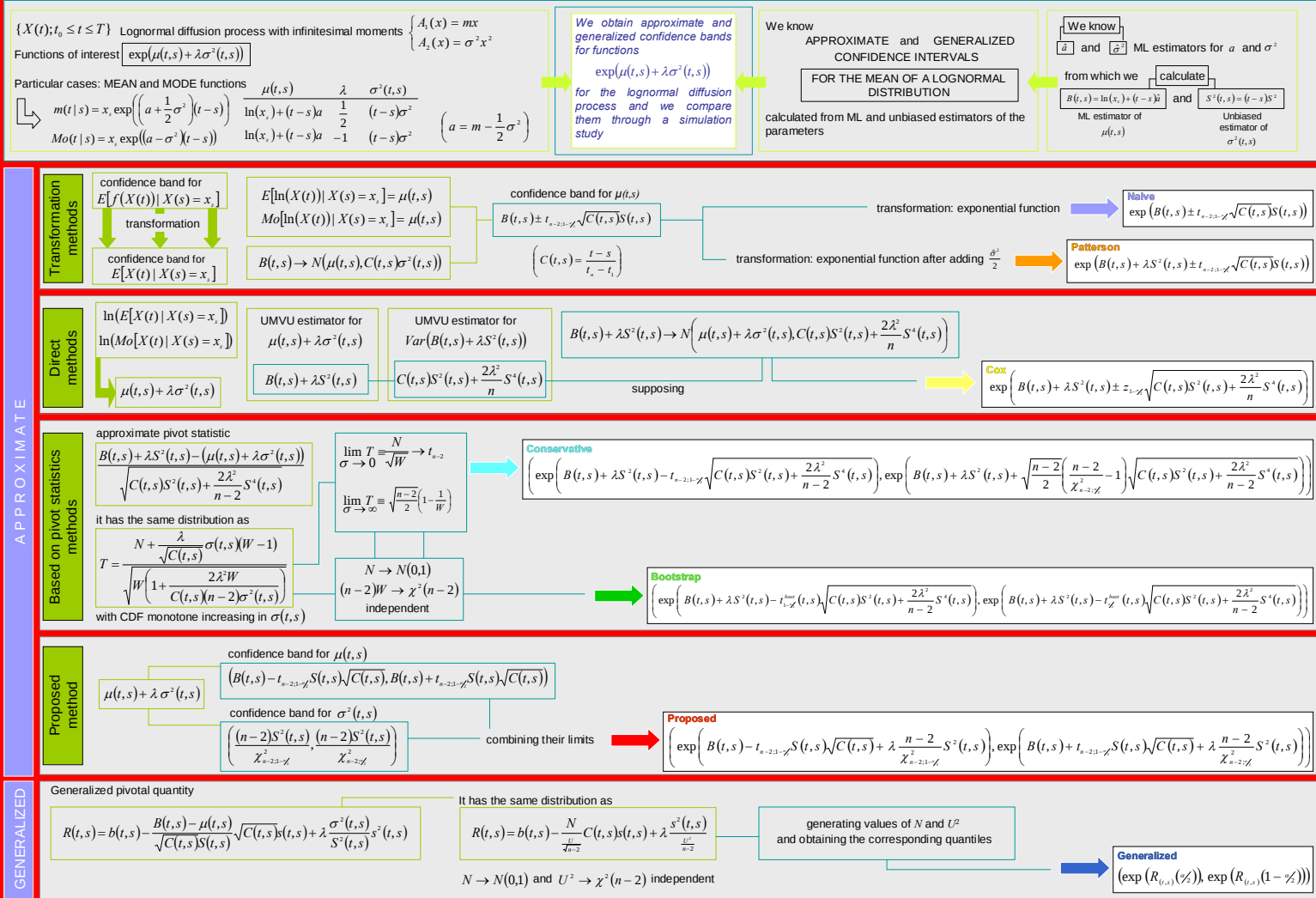




Approximate and Generalized Confidence Bands for the Mean Function of the Lognormal Diffusion Process: A Simulation Study

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CONSIDERATIONS ON THE SIMULATION STUDY

- Independence on m : it will only affect in a scale change $\Rightarrow$ we take $m=0$
- Coverage probability remains constant through the time
- Average width increases with t $\Rightarrow$ we compare average widths in common times
- number of simulated paths: 1000
- sample sizes considered: $n=11, n=51, n=101$
- time instants considered: from $t_1=0$ to $t_n=n-1$
- values for σ^2 considered: 0.0000001, 0.000001, 0.00001, 0.0001, 0.001, 0.01 and 0.1
- confidence level: 0.9

GRAPHICS FOR THE SIMULATION STUDY



CONCLUSIONS FROM THE RESULTS OF THE SIMULATION STUDY

- Naive method is inappropriate. Its coverage error increases greatly when n or σ^2 increase
- Patterson's, bootstrap and proposed methods all present good results, except in the case of the latter for large values of σ^2
- Cox's method gives better results when the sample size increases and it then achieves results close to those given by Patterson's method
- Conservative method gives higher coverage probabilities than the fixed confidence level
- Generalized method is a Monte Carlo procedure for calculating proposed confidence bands. Its behaviour will be similar to those

σ^2	Method	n=11			n=51			n=101					
		Coverage probability	Coverage error	Average width	Coverage probability	Coverage error	Average width	Coverage probability	Coverage error	Average width			
0.0000001	Naive	0.913	0.013	0.000364	0.003945	0.902	0.002	0.000485	0.003893	0.904	0.004	0.000444	0.003439
	Patterson	0.920	0.020	0.000354	0.003846	0.902	0.002	0.000485	0.003893	0.904	0.004	0.000444	0.003439
	Cox	0.872	0.028	0.000388	0.003838	0.902	0.002	0.000485	0.003893	0.904	0.004	0.000444	0.003439
	Conservative	0.958	0.058	0.000502	0.003930	0.937	0.037	0.000736	0.004074	0.936	0.036	0.000736	0.004074
	Bootstrap	0.904	0.006	0.000356	0.003846	0.903	0.007	0.000484	0.003894	0.904	0.006	0.000443	0.003438
	Proposed	0.934	0.034	0.000365	0.003851	0.902	0.002	0.000485	0.003893	0.904	0.004	0.000444	0.003439
	Generalized	0.902	0.002	0.000362	0.003846	0.906	0.004	0.000483	0.003895	0.903	0.007	0.000445	0.003438
0.0000001	Naive	0.913	0.013	0.000364	0.003945	0.902	0.002	0.000485	0.003894	0.903	0.003	0.000361	0.003101
	Patterson	0.920	0.020	0.000354	0.003846	0.902	0.002	0.000485	0.003894	0.904	0.004	0.000444	0.003439
	Cox	0.872	0.028	0.000388	0.003838	0.905	0.005	0.000468	0.004075	0.906	0.004	0.000327	0.003103
	Conservative	0.958	0.058	0.000502	0.003930	0.937	0.037	0.000742	0.004029	0.937	0.037	0.000744	0.004034
	Bootstrap	0.905	0.005	0.000329	0.003297	0.901	0.009	0.000469	0.004089	0.905	0.005	0.000329	0.003297
	Proposed	0.932	0.032	0.000361	0.003847	0.902	0.004	0.000471	0.004076	0.904	0.004	0.000444	0.003439
	Generalized	0.909	0.009	0.000325	0.003278	0.907	0.003	0.000467	0.004172	0.907	0.003	0.000321	0.003103
0.00001	Naive	0.913	0.013	0.000364	0.003946	0.902	0.002	0.000485	0.003894	0.905	0.001	0.000439	0.003103
	Patterson	0.920	0.020	0.000354	0.003846	0.902	0.002	0.000485	0.003894	0.904	0.004	0.000444	0.003439
	Cox	0.873	0.027	0.000388	0.003848	0.905	0.005	0.000457	0.004174	0.906	0.004	0.000342	0.003104
	Conservative	0.958	0.058	0.000504	0.003934	0.937	0.037	0.000784	0.004183	0.937	0.037	0.000782	0.004178
	Bootstrap	0.904	0.004	0.000329	0.003298	0.904	0.004	0.000484	0.004076	0.904	0.004	0.000329	0.003298
	Proposed	0.936	0.036	0.000374	0.003875	0.902	0.002	0.000488	0.003897	0.904	0.004	0.000403	0.003426
	Generalized	0.904	0.004	0.000370	0.003873	0.907	0.003	0.000484	0.004040	0.907	0.003	0.000441	0.003429
0.0001	Naive	0.913	0.013	0.000364	0.003946	0.902	0.002	0.000486	0.003894	0.904	0.003	0.000439	0.003103
	Patterson	0.920	0.020	0.000354	0.003846	0.902	0.002	0.000486	0.003894	0.904	0.003	0.000439	0.003103
	Cox	0.872	0.027	0.000388	0.003848	0.905	0.005	0.000457	0.004174	0.906	0.004	0.000342	0.003104
	Conservative	0.958	0.058	0.000504	0.003934	0.937	0.037	0.000784	0.004183	0.937	0.037	0.000782	0.004178
	Bootstrap	0.904	0.004	0.000329	0.003298	0.904	0.004	0.000484	0.004076	0.904	0.004	0.000329	0.003298
	Proposed	0.936	0.036	0.000374	0.003875	0.902	0.002	0.000488	0.003897	0.904	0.004	0.000403	0.003426
	Generalized	0.904	0.004	0.000370	0.003873	0.907	0.003	0.000484	0.004040	0.907	0.003	0.000441	0.003429
0.001	Naive	0.913	0.013	0.000364	0.003946	0.902	0.002	0.000486	0.003894	0.904	0.003	0.000439	0.003103
	Patterson	0.920	0.020	0.000354	0.003846	0.902	0.002	0.000486	0.003894	0.904	0.003	0.000439	0.003103
	Cox	0.873	0.027	0.000388	0.003848	0.905	0.005	0.000457	0.004174	0.906	0.004	0.000342	0.003104
	Conservative	0.958	0.058	0.000504	0.003934	0.937	0.037	0.000784	0.004183	0.937	0.037	0.000782	0.004178
	Bootstrap	0.905	0.005	0.000366	0.003635	0.905	0.005	0.000503	0.003895	0.904	0.006	0.000386	0.003493
	Proposed	0.937	0.037	0.000745	0.003748	0.905	0.005	0.000820	0.004295	0.901	0.01	0.000761	0.003495
	Generalized	0.907	0.007	0.000431	0.004329	0.906	0.004	0.004394	0.004700	0.903	0.007	0.000395	0.003496
0.01	Naive	0.913	0.013	0.000364	0.003946	0.902	0.002	0.000486	0.003894	0.904	0.003	0.000439	0.003103
	Patterson	0.920	0.020	0.000354	0.003846	0.902	0.002	0.000486	0.003894	0.904	0.003	0.000439	0.003103
	Cox	0.873	0.027	0.000388	0.003848	0.905	0.005	0.000457	0.004174	0.906	0.004	0.000342	0.003104
	Conservative	0.958	0.058	0.000504	0.003934	0.937	0.037	0.000784	0.004183	0.937	0.037	0.000782	0.004178
	Bootstrap	0.905	0.005	0.000366	0.003635	0.905	0.005	0.000503	0.003895	0.904	0.006	0.000386	0.003493
	Proposed	0.937	0.037	0.000745	0.003748	0.905	0.005	0.000820	0.004295	0.901	0.01	0.000761	0.003495
	Generalized	0.907	0.007	0.000431	0.004329	0.906	0.004	0.004394	0.004700	0.903	0.007	0.000395	0.003496
0.1	Naive	0.913	0.013	0.000364	0.003946	0.902	0.002	0.000486	0.003894	0.904	0.003	0.000439	0.003103
	Patterson	0.920	0.020	0.000354	0.003846	0.902	0.002	0.000486	0.003894	0.904	0.003	0.000439	0.003103
	Cox	0.873	0.027	0.000388	0.003848	0.905	0.005	0.000457	0.004174	0.906	0.004	0.000342	0.003104
	Conservative	0.958	0.058	0.000504	0.003934	0.937	0.037	0.000784	0.004183	0.937	0.037	0.000782	0.004178
	Bootstrap	0.905	0.005	0.000366	0.003635	0.905	0.005	0.000503	0.003895	0.904	0.006	0.000386	0.003493
	Proposed	0.937	0.037	0.000745	0.003748	0.905	0.005	0.000820	0.004295	0.901	0.01	0.000761	0.003495
	Generalized	0.907	0.007	0.000431	0.004329	0.906	0.004	0.004394	0.004700	0.903	0.007	0.000395	0.003496