Study 5: Layer Sensitivity in Exponential–Gaussian Copula VAR — Indicator vs. Latent Skewness

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0. Summary

This study evaluates whether (and how strongly) **dynamic parameter inference** for a bivariate VAR(1) depends on *where* non-Gaussianity is placed in the hierarchy when fitting an **Exponential–Gaussian (EG) copula** model.

Two alternative model structures are compared:

- **EI (Indicator-Exponential):** signed/shifted Exponential margins on **measurement errors** with a Gaussian copula at the measurement layer.
- **EL (Latent-Exponential):** signed/shifted Exponential margins on **VAR innovations** with a Gaussian copula at the innovation layer.

We generate data under two corresponding DGPs (Study A and Study B) and fit both EI and EL in every condition. The central question is:

> When the Exponential-copula layer is *misplaced* (indicator vs latent), does inference for (μ, Φ, ρ) degrade meaningfully, and if so, in what way (bias, calibration, or sampling pathologies)?

1. Introduction

The Exponential–Gaussian copula construction separates:

1. **marginals** (signed/shifted Exponential) and
2. **dependence** (Gaussian copula with parameter ρ).

This study specifically probes *layer sensitivity*: whether placing that copula-marginal construction on **measurement residuals** vs **state/innovation residuals** yields meaningfully different posterior behaviour for the VAR dynamics.

1.1 Data generating processes

All conditions use a fixed bivariate VAR(1) coefficient matrix Φ and $\mu = 0$.

Study A: indicator-skew DGP

Latent state evolves with Gaussian innovations:

$$x_t = \mu + \Phi x_{t-1} + u_t, \qquad u_t \sim \mathcal{N}(0, I_2)$$

Observed indicators equal state plus **signed/shifted Exponential** measurement residuals:

$$y_t = x_t + \varepsilon_t,$$

where each component of ε_t is standardized to mean 0 and variance 1 using the transforms:

- Right-skew: $\varepsilon = X - 1$, $X \sim \text{Exp}(1)$, support $\varepsilon \geq -1$.

- Left-skew: $\varepsilon = 1 - X$, $X \sim \text{Exp}(1)$, support $\varepsilon \leq 1$.

Dependence between $(\varepsilon_{t1}, \varepsilon_{t2})$ is imposed by a **Gaussian copula** with correlation parameter ρ.

Study B: latent-skew DGP

Observed series follow a VAR(1) recursion where innovations are signed/shifted Exponential with Gaussian-copula dependence:

$$y_t = \mu + \Phi y_{t-1} + \zeta_t,$$

with (ζ_{t1}, ζ_{t2}) generated from signed/shifted Exponential margins and Gaussian copula correlation ρ.

1.2 Experimental factors

Conditions vary:

- **DGP type:** Study A vs Study B
- **Direction pattern:** `++` (both right-skew) vs `+-` (mixed skew)
- **Length:** $T \in \{100, 200\}$
- **Dependence:** $\rho = 0.30$

Both models (EI and EL) are fit for each replication in each condition.

Table 1: Design grid overview

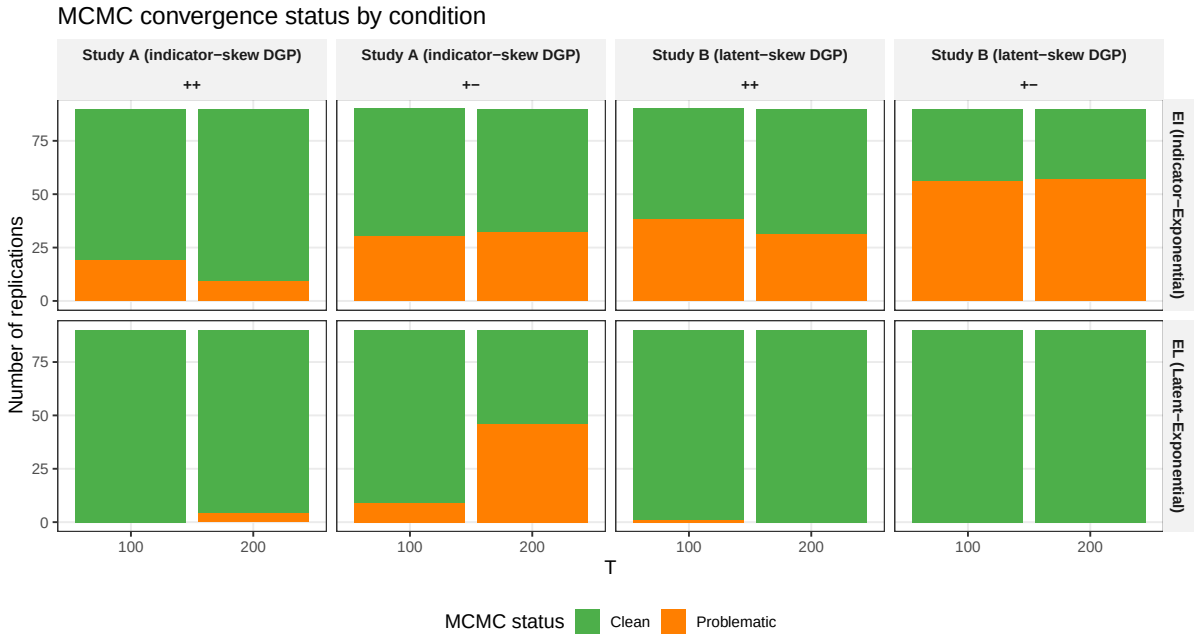
sem_study	direction	T	rho	N_conditions	n_reps
A_indicator	++	100	0.3	1	90
A_indicator	++	200	0.3	1	90
A_indicator	+-	100	0.3	1	90
A_indicator	+-	200	0.3	1	90
B_latent	++	100	0.3	1	90
B_latent	++	200	0.3	1	90
B_latent	+-	100	0.3	1	90
B_latent	+-	200	0.3	1	90

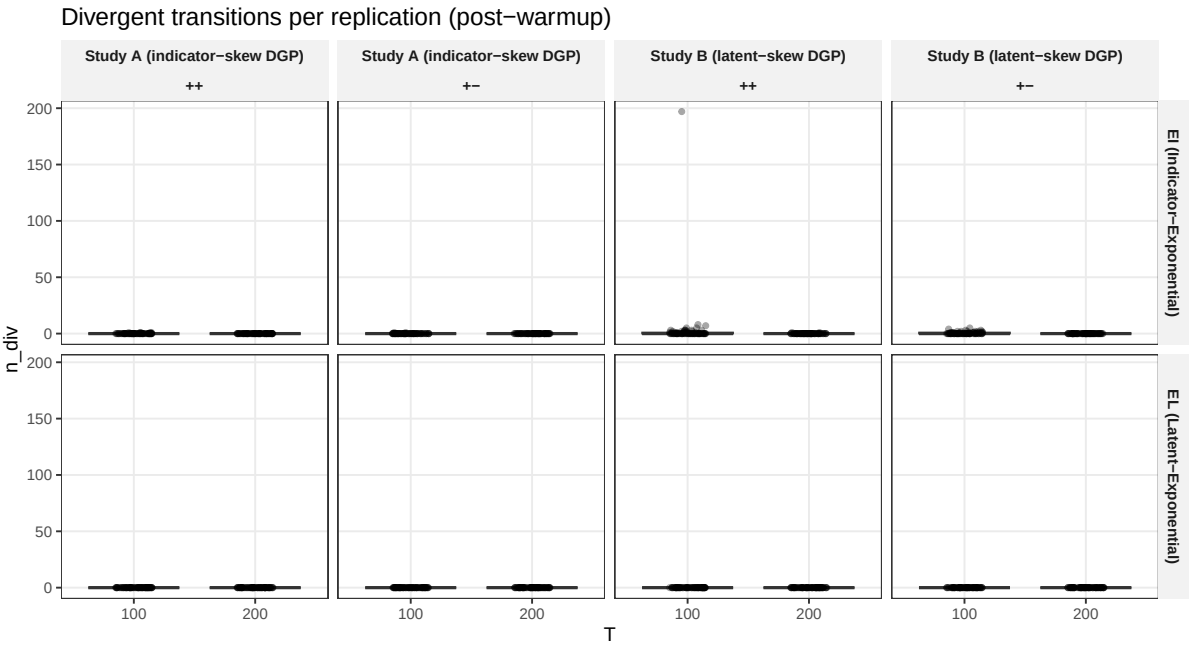
2. Data loading and preparation

2.1 MCMC classification and overview

Replication runs are classified using the same conventions as Studies 1–3:

- **Failed/Error:** the fit did not complete successfully (`status != "ok"`) or diagnostics are missing.
- **Problematic:** sampling completed but either (i) `max_rhat > 1.01` or (ii) `n_div > 0` (if recorded).
- **Clean:** sampling completed and diagnostics are within thresholds.

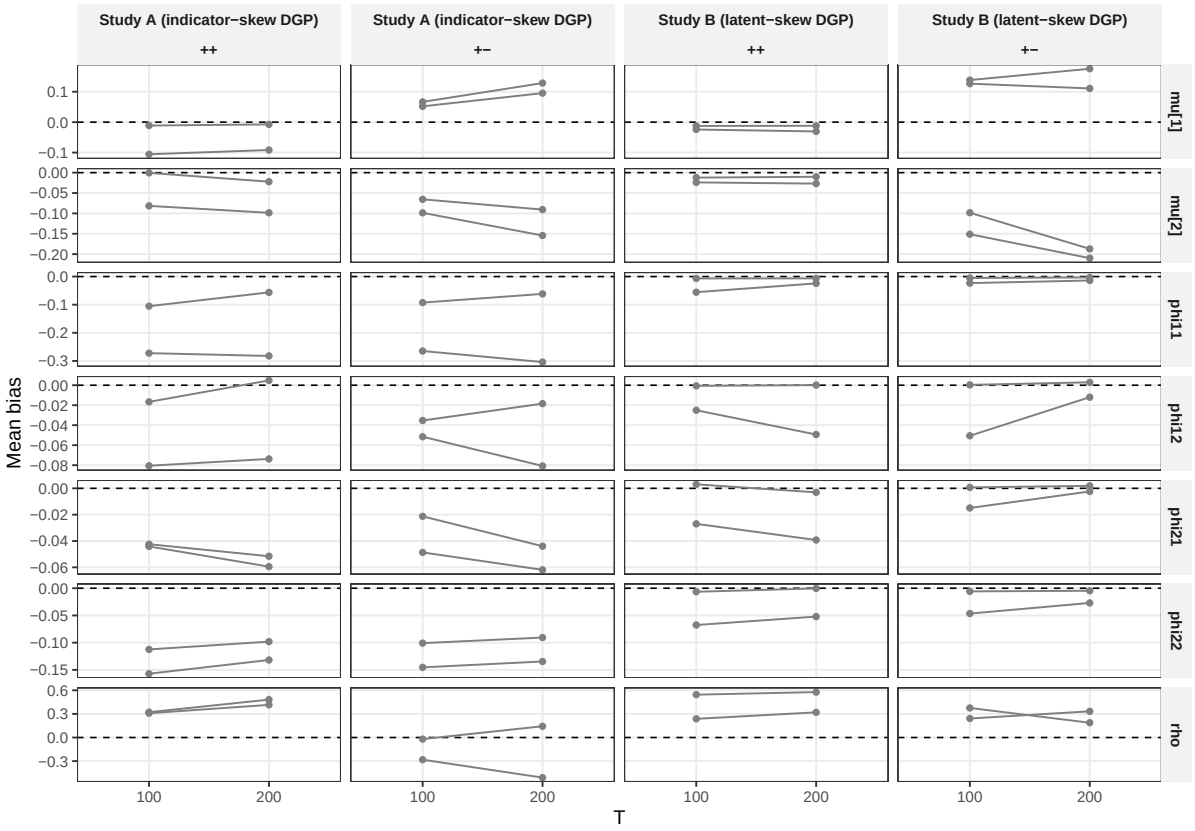




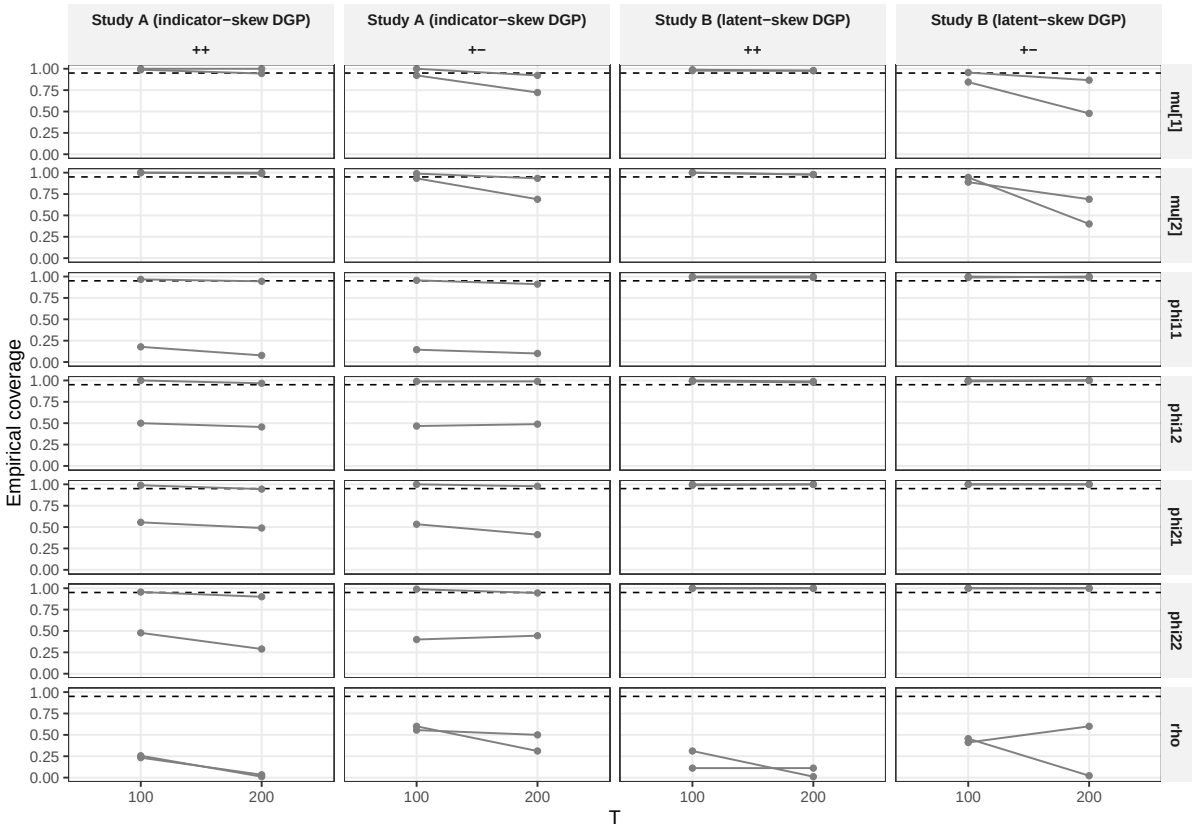
3. Results: recovery of core dynamic parameters

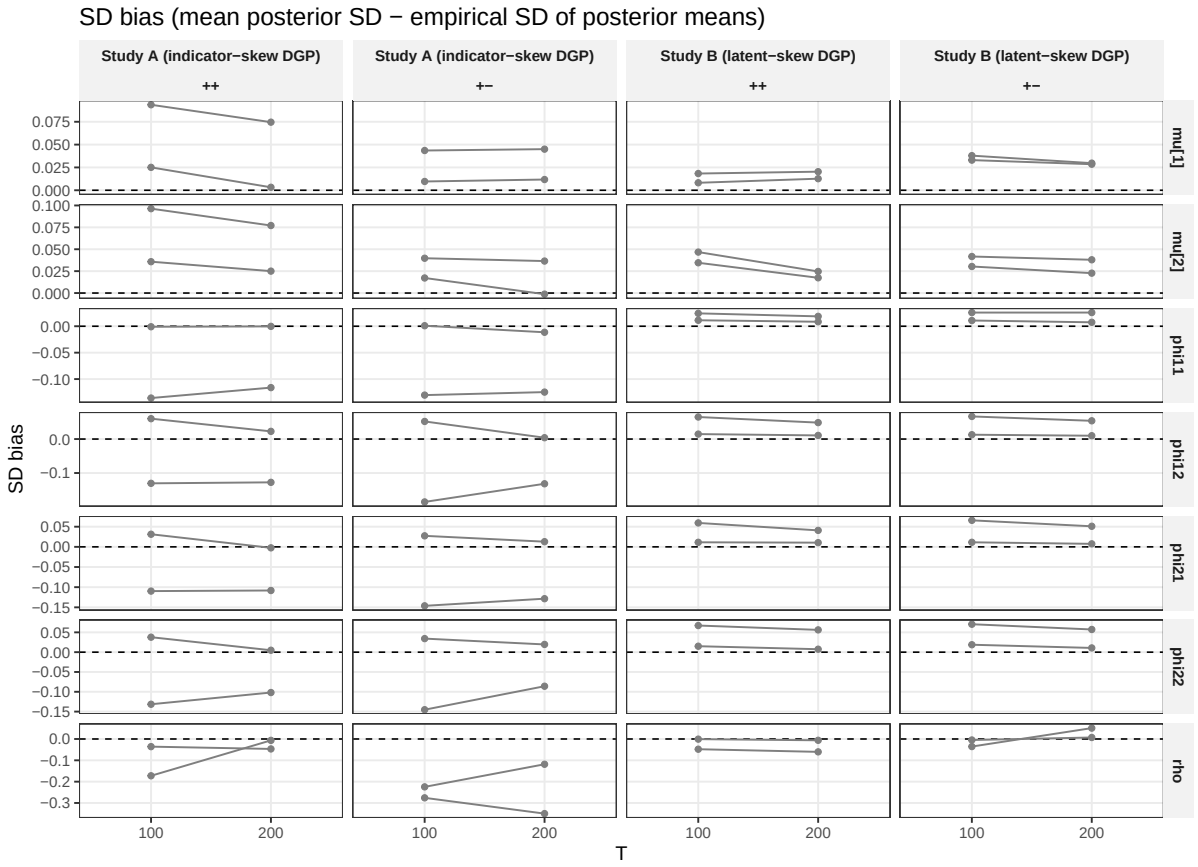
Condition-level metrics are computed over replications with `status == "ok"` (completed sampling). This matches Studies 1–3 and avoids silently dropping non-converged runs.

Bias of core parameters (condition means)



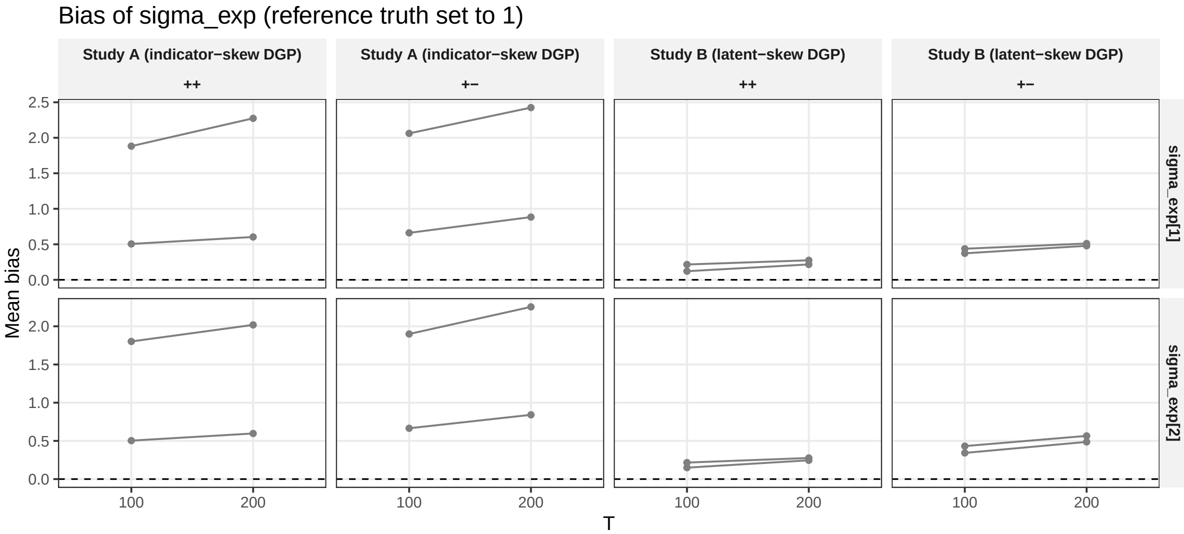
95% interval coverage of core parameters





4. Secondary parameters: shift terms σ_{exp}

The Exponential likelihood is implemented via a shift so that the transformed variable remains positive. As a result, σ_{exp} is best viewed as a *nuisance/feasibility* term (and may be sample-dependent under the soft-max construction in the Stan code).



5. Exportable summary tables

Table 2: Exportable core-parameter summary (rounded)

sem_study	direction	T	rho	Model	param	N_exp	N_ok	prop_ok	mean_bias	coverage_95	mean_post_sd	emp_sd	sd_bias	RMSE	mean_div	mean_rhat
Study A (indicator-skew DGP)	++	100	0.3	EI (Indicator-Exponential)	mu[1]	90	90	1	-0.011	0.989	0.118	0.093	0.025	0.094	0.056	1.040
Study A (indicator-skew DGP)	++	100	0.3	EI (Indicator-Exponential)	mu[2]	90	90	1	-0.001	1.000	0.136	0.100	0.036	0.100	0.056	1.040
Study A (indicator-skew DGP)	++	100	0.3	EI (Indicator-Exponential)	phi11	90	90	1	-0.105	0.967	0.137	0.137	-0.001	0.173	0.056	1.040
Study A (indicator-skew DGP)	++	100	0.3	EI (Indicator-Exponential)	phi12	90	90	1	-0.017	1.000	0.163	0.104	0.060	0.105	0.056	1.040
Study A (indicator-skew DGP)	++	100	0.3	EI (Indicator-Exponential)	phi21	90	90	1	-0.042	0.989	0.138	0.107	0.031	0.115	0.056	1.040

sem_study	direction	T	n_rho	Model	param	N_exp	N_ctrl	n_dropped	mean_bias	mean_covered	mean_area	95_post_sd	RMSE	mean_rhat	mean_div
Study A (indicator-skew DGP)	++	100	0.3	EI (Indicator-Exponential)	phi22	90	90	1	-0.112	0.956	0.167	0.130	0.038	0.172	2.056	1.040
Study A (indicator-skew DGP)	++	100	0.3	EI (Indicator-Exponential)	rho	90	90	1	0.322	0.256	0.163	0.335	-0.173	0.465	2.056	1.040
Study A (indicator-skew DGP)	++	100	0.3	EL (Latent-Exponential)	mu[1]	90	90	1	-0.106	1.000	0.178	0.084	0.094	0.135	0.000	1.001
Study A (indicator-skew DGP)	++	100	0.3	EL (Latent-Exponential)	mu[2]	90	90	1	-0.082	1.000	0.174	0.078	0.096	0.118	0.000	1.001
Study A (indicator-skew DGP)	++	100	0.3	EL (Latent-Exponential)	phi11	90	90	1	-0.272	0.178	0.067	0.203	-0.136	0.339	0.000	1.001
Study A (indicator-skew DGP)	++	100	0.3	EL (Latent-Exponential)	phi12	90	90	1	-0.081	0.500	0.073	0.203	-0.130	0.219	0.000	1.001
Study A (indicator-skew DGP)	++	100	0.3	EL (Latent-Exponential)	phi21	90	90	1	-0.044	0.556	0.072	0.182	-0.110	0.187	0.000	1.001
Study A (indicator-skew DGP)	++	100	0.3	EL (Latent-Exponential)	phi22	90	90	1	-0.157	0.478	0.078	0.209	-0.131	0.262	0.000	1.001
Study A (indicator-skew DGP)	++	100	0.3	EL (Latent-Exponential)	rho	90	90	1	0.309	0.233	0.093	0.129	-0.036	0.335	0.000	1.001
Study B (latent-skew DGP)	++	100	0.3	EI (Indicator-Exponential)	mu[1]	90	90	1	-0.013	0.989	0.108	0.099	0.008	0.102	2.867	2.681

sem_study	direction	T	rho	Model	param	N_expected	N_ok	prop_ok	mean_bias	coverage_95	mean_post_sd		sd_bias	RMSE	mean_div	mean_rhat
Study B (latent-skew DGP)	++	100	0.3	EI (Indicator-Exponential)	mu[2]	90	90	1	-0.012	1.000	0.122	0.075	0.047	0.076	2.867	2.681
Study B (latent-skew DGP)	++	100	0.3	EI (Indicator-Exponential)	phi11	90	90	1	-0.056	0.989	0.127	0.103	0.024	0.117	2.867	2.681
Study B (latent-skew DGP)	++	100	0.3	EI (Indicator-Exponential)	phi12	90	90	1	-0.025	0.989	0.158	0.093	0.065	0.096	2.867	2.681
Study B (latent-skew DGP)	++	100	0.3	EI (Indicator-Exponential)	phi21	90	90	1	-0.027	1.000	0.126	0.067	0.059	0.072	2.867	2.681
Study B (latent-skew DGP)	++	100	0.3	EI (Indicator-Exponential)	phi22	90	90	1	-0.068	1.000	0.164	0.096	0.067	0.118	2.867	2.681
Study B (latent-skew DGP)	++	100	0.3	EI (Indicator-Exponential)	rho	90	90	1	0.545	0.111	0.123	0.171	-0.048	0.571	2.867	2.681
Study B (latent-skew DGP)	++	100	0.3	EL (Latent-Exponential)	mu[1]	90	90	1	-0.024	0.978	0.105	0.086	0.018	0.090	0.000	1.001
Study B (latent-skew DGP)	++	100	0.3	EL (Latent-Exponential)	mu[2]	90	90	1	-0.024	1.000	0.105	0.070	0.035	0.074	0.000	1.001
Study B (latent-skew DGP)	++	100	0.3	EL (Latent-Exponential)	phi11	90	90	1	-0.007	1.000	0.040	0.028	0.011	0.029	0.000	1.001
Study B (latent-skew DGP)	++	100	0.3	EL (Latent-Exponential)	phi12	90	90	1	-0.001	1.000	0.045	0.031	0.015	0.031	0.000	1.001

sem_study	direction	T	N	rho	Model	param	N_exp	N_ctrl	prop_ok	bias	coverage	95_post_sd	bias_sd	RMSE	mean_rhat	min_div
Study B (latent-skew DGP)	++	100	0.3	EL (Latent-Exponential)	phi[2]	190	90	1	0.003	0.989	0.039	0.028	0.011	0.028	1.000	1.001
Study B (latent-skew DGP)	++	100	0.3	EL (Latent-Exponential)	phi[2]	290	90	1	-0.007	1.000	0.046	0.031	0.015	0.032	1.000	1.001
Study B (latent-skew DGP)	++	100	0.3	EL (Latent-Exponential)	rho	90	90	1	0.237	0.311	0.092	0.093	-0.001	0.255	1.000	1.001
Study A (indicator-skew DGP)	+-	100	0.3	EI (Indicator-Exponential)	mu[1]	190	90	1	0.067	0.922	0.130	0.120	0.010	0.137	1.022	1.016
Study A (indicator-skew DGP)	+-	100	0.3	EI (Indicator-Exponential)	mu[2]	190	90	1	-0.099	0.933	0.151	0.134	0.017	0.166	1.022	1.016
Study A (indicator-skew DGP)	+-	100	0.3	EI (Indicator-Exponential)	phi[1]	190	90	1	-0.093	0.956	0.135	0.134	0.001	0.163	1.022	1.016
Study A (indicator-skew DGP)	+-	100	0.3	EI (Indicator-Exponential)	phi[1]	290	90	1	-0.035	0.989	0.163	0.111	0.052	0.116	1.022	1.016
Study A (indicator-skew DGP)	+-	100	0.3	EI (Indicator-Exponential)	phi[2]	190	90	1	-0.021	1.000	0.143	0.116	0.027	0.118	1.022	1.016
Study A (indicator-skew DGP)	+-	100	0.3	EI (Indicator-Exponential)	phi[2]	290	90	1	-0.101	0.989	0.171	0.137	0.034	0.170	1.022	1.016
Study A (indicator-skew DGP)	+-	100	0.3	EI (Indicator-Exponential)	rho	90	90	1	-0.020	0.600	0.290	0.566	-0.276	0.566	1.022	1.016

sem_study	direction	T	rho	Model	param	N_expected	N_ok	prop_ok	mean_bias	coverage_95	mean_post_sd	emp_sd	sd_bias	RMSE	mean_n_div	mean_rhat
Study A (indicator-skew DGP)	+-	100	0.3	EL (Latent-Exponential)	mu[1]	90	90	1	0.052	1.000	0.204	0.161	0.044	0.169	0.000	1.004
Study A (indicator-skew DGP)	+-	100	0.3	EL (Latent-Exponential)	mu[2]	90	90	1	-0.065	0.989	0.202	0.162	0.040	0.175	0.000	1.004
Study A (indicator-skew DGP)	+-	100	0.3	EL (Latent-Exponential)	phi11	90	90	1	-0.265	0.144	0.066	0.196	-0.130	0.329	0.000	1.004
Study A (indicator-skew DGP)	+-	100	0.3	EL (Latent-Exponential)	phi12	90	90	1	-0.052	0.467	0.090	0.275	-0.185	0.280	0.000	1.004
Study A (indicator-skew DGP)	+-	100	0.3	EL (Latent-Exponential)	phi21	90	90	1	-0.049	0.533	0.079	0.226	-0.146	0.231	0.000	1.004
Study A (indicator-skew DGP)	+-	100	0.3	EL (Latent-Exponential)	phi22	90	90	1	-0.145	0.400	0.071	0.216	-0.145	0.260	0.000	1.004
Study A (indicator-skew DGP)	+-	100	0.3	EL (Latent-Exponential)	rho	90	90	1	-0.282	0.556	0.242	0.467	-0.224	0.545	0.000	1.004
Study B (latent-skew DGP)	+-	100	0.3	EI (Indicator-Exponential)	mu[1]	90	90	1	0.126	0.956	0.125	0.087	0.038	0.154	0.456	5.896
Study B (latent-skew DGP)	+-	100	0.3	EI (Indicator-Exponential)	mu[2]	90	90	1	-0.151	0.889	0.143	0.101	0.042	0.182	0.456	5.896
Study B (latent-skew DGP)	+-	100	0.3	EI (Indicator-Exponential)	phi11	90	90	1	-0.023	1.000	0.125	0.099	0.026	0.101	0.456	5.896

sem_study	direction	T	rho	Model	param	N_expected	N_ok	prop_ok	mean_bias	coverage_95	mean_ci95_width	mean_post_sd	sd_bias	RMSE	mean_n_div	mean_rhat
Study B (latent-skew DGP)	+-	100	0.3	EI (Indicator-Exponential)	phi12	90	90	1	-0.051	0.989	0.161	0.095	0.067	0.107	0.456	5.896
Study B (latent-skew DGP)	+-	100	0.3	EI (Indicator-Exponential)	phi21	90	90	1	-0.015	1.000	0.125	0.059	0.066	0.061	0.456	5.896
Study B (latent-skew DGP)	+-	100	0.3	EI (Indicator-Exponential)	phi22	90	90	1	-0.047	1.000	0.165	0.094	0.070	0.105	0.456	5.896
Study B (latent-skew DGP)	+-	100	0.3	EI (Indicator-Exponential)	rho	90	90	1	0.376	0.411	0.322	0.357	-0.035	0.518	0.456	5.896
Study B (latent-skew DGP)	+-	100	0.3	EL (Latent-Exponential)	mu[1]	90	90	1	0.138	0.844	0.118	0.085	0.033	0.162	0.000	1.001
Study B (latent-skew DGP)	+-	100	0.3	EL (Latent-Exponential)	mu[2]	90	90	1	-0.098	0.944	0.116	0.086	0.030	0.130	0.000	1.001
Study B (latent-skew DGP)	+-	100	0.3	EL (Latent-Exponential)	phi11	90	90	1	-0.005	0.989	0.036	0.025	0.011	0.026	0.000	1.001
Study B (latent-skew DGP)	+-	100	0.3	EL (Latent-Exponential)	phi12	90	90	1	0.000	1.000	0.045	0.032	0.013	0.032	0.000	1.001
Study B (latent-skew DGP)	+-	100	0.3	EL (Latent-Exponential)	phi21	90	90	1	0.001	1.000	0.035	0.024	0.011	0.024	0.000	1.001
Study B (latent-skew DGP)	+-	100	0.3	EL (Latent-Exponential)	phi22	90	90	1	-0.006	1.000	0.044	0.025	0.019	0.026	0.000	1.001

sem_study	direction	T	rho	Model	param	N_expected	N_ok	prop_ok	mean_bias	coverage_95	mean_post_sd	emp_sd	ld_bias	RMSE	mean_div	rhat
Study B (latent-skew DGP)	+-	100	0.3	EL (Latent-Exponential)	rho	90	90	1	0.242	0.456	0.107	0.112	-0.005	0.266	0.000	1.001
Study A (indicator-skew DGP)	++	200	0.3	EI (Indicator-Exponential)	mu[1]	90	90	1	-0.007	0.944	0.085	0.081	0.003	0.082	0.000	1.126
Study A (indicator-skew DGP)	++	200	0.3	EI (Indicator-Exponential)	mu[2]	90	90	1	-0.022	0.989	0.107	0.082	0.025	0.085	0.000	1.126
Study A (indicator-skew DGP)	++	200	0.3	EI (Indicator-Exponential)	phi11	90	90	1	-0.056	0.944	0.091	0.091	0.000	0.107	0.000	1.126
Study A (indicator-skew DGP)	++	200	0.3	EI (Indicator-Exponential)	phi12	90	90	1	0.005	0.967	0.125	0.103	0.023	0.103	0.000	1.126
Study A (indicator-skew DGP)	++	200	0.3	EI (Indicator-Exponential)	phi21	90	90	1	-0.052	0.944	0.101	0.104	-0.002	0.116	0.000	1.126
Study A (indicator-skew DGP)	++	200	0.3	EI (Indicator-Exponential)	phi22	90	90	1	-0.098	0.900	0.124	0.120	0.005	0.155	0.000	1.126
Study A (indicator-skew DGP)	++	200	0.3	EI (Indicator-Exponential)	rho	90	90	1	0.481	0.011	0.065	0.071	-0.006	0.487	0.000	1.126
Study A (indicator-skew DGP)	++	200	0.3	EL (Latent-Exponential)	mu[1]	90	90	1	-0.092	1.000	0.161	0.086	0.075	0.126	0.000	1.382
Study A (indicator-skew DGP)	++	200	0.3	EL (Latent-Exponential)	mu[2]	90	90	1	-0.099	1.000	0.152	0.075	0.077	0.124	0.000	1.382

sem_study	direction	T	rho	Model	param	N_expected	N_ok	prop_ok	mean_bias	coverage_95	mean_post_sd	emp_sd	rel_bias	RMSE	mean_div	mean_rhat
Study A (indicator-skew DGP)	++	200	0.3	EL (Latent-Exponential)	phi11	90	90	1	-0.282	0.078	0.046	0.162	-0.116	0.325	0.000	1.382
Study A (indicator-skew DGP)	++	200	0.3	EL (Latent-Exponential)	phi12	90	90	1	-0.074	0.456	0.063	0.191	-0.127	0.205	0.000	1.382
Study A (indicator-skew DGP)	++	200	0.3	EL (Latent-Exponential)	phi21	90	90	1	-0.059	0.489	0.051	0.160	-0.108	0.170	0.000	1.382
Study A (indicator-skew DGP)	++	200	0.3	EL (Latent-Exponential)	phi22	90	90	1	-0.132	0.289	0.052	0.154	-0.102	0.203	0.000	1.382
Study A (indicator-skew DGP)	++	200	0.3	EL (Latent-Exponential)	rho	90	90	1	0.415	0.033	0.056	0.102	-0.047	0.427	0.000	1.382
Study B (latent-skew DGP)	++	200	0.3	EI (Indicator-Exponential)	mu[1]	90	90	1	-0.012	0.978	0.080	0.068	0.013	0.069	0.022	5.664
Study B (latent-skew DGP)	++	200	0.3	EI (Indicator-Exponential)	mu[2]	90	90	1	-0.010	0.978	0.097	0.072	0.025	0.073	0.022	5.664
Study B (latent-skew DGP)	++	200	0.3	EI (Indicator-Exponential)	phi11	90	90	1	-0.024	0.989	0.088	0.070	0.019	0.074	0.022	5.664
Study B (latent-skew DGP)	++	200	0.3	EI (Indicator-Exponential)	phi12	90	90	1	-0.049	0.978	0.120	0.072	0.048	0.087	0.022	5.664
Study B (latent-skew DGP)	++	200	0.3	EI (Indicator-Exponential)	phi21	90	90	1	-0.039	1.000	0.092	0.051	0.041	0.064	0.022	5.664

sem_study	direction	T	rho	Model	param	N_expected	N_ok	prop_ok	mean_bias	coverage_95	mean_post_sd	emp_sd	sd_bias	RMSE	mean_div	mean_rhat
Study B (latent-skew DGP)	++	200	0.3	EI (Indicator-Exponential)	phi22	90	90	1	-0.052	1.000	0.119	0.063	0.056	0.081	0.022	5.664
Study B (latent-skew DGP)	++	200	0.3	EI (Indicator-Exponential)	rho	90	90	1	0.577	0.111	0.109	0.169	-0.060	0.601	0.022	5.664
Study B (latent-skew DGP)	++	200	0.3	EL (Latent-Exponential)	mu[1]	90	90	1	-0.031	0.978	0.082	0.061	0.020	0.069	0.000	1.001
Study B (latent-skew DGP)	++	200	0.3	EL (Latent-Exponential)	mu[2]	90	90	1	-0.027	0.978	0.082	0.064	0.017	0.070	0.000	1.001
Study B (latent-skew DGP)	++	200	0.3	EL (Latent-Exponential)	phi11	90	90	1	-0.006	1.000	0.026	0.017	0.008	0.018	0.000	1.001
Study B (latent-skew DGP)	++	200	0.3	EL (Latent-Exponential)	phi12	90	90	1	0.000	0.989	0.030	0.020	0.011	0.020	0.000	1.001
Study B (latent-skew DGP)	++	200	0.3	EL (Latent-Exponential)	phi21	90	90	1	-0.003	1.000	0.026	0.015	0.010	0.015	0.000	1.001
Study B (latent-skew DGP)	++	200	0.3	EL (Latent-Exponential)	phi22	90	90	1	0.000	1.000	0.031	0.023	0.007	0.023	0.000	1.001
Study B (latent-skew DGP)	++	200	0.3	EL (Latent-Exponential)	rho	90	90	1	0.320	0.011	0.049	0.055	-0.006	0.325	0.000	1.001
Study A (indicator-skew DGP)	+-	200	0.3	EI (Indicator-Exponential)	mu[1]	90	90	1	0.128	0.722	0.108	0.096	0.012	0.160	0.000	2.353

sem_study	direction	T	rho	Model	param	N_expected	N_ok	prop_ok	mean_bias	coverage_95	mean_post_sd	sd_bias	[illegible]	RMSE	mean_div	mean_rhat
Study A (indicator-skew DGP)	+-	200	0.3	EI (Indicator-Exponential)	mu[2]	90	90	1	-0.154	0.689	0.130	0.131	-0.001	0.203	0.000	2.353
Study A (indicator-skew DGP)	+-	200	0.3	EI (Indicator-Exponential)	phi11	90	90	1	-0.062	0.911	0.097	0.109	-0.011	0.125	0.000	2.353
Study A (indicator-skew DGP)	+-	200	0.3	EI (Indicator-Exponential)	phi12	90	90	1	-0.018	0.989	0.128	0.124	0.004	0.125	0.000	2.353
Study A (indicator-skew DGP)	+-	200	0.3	EI (Indicator-Exponential)	phi21	90	90	1	-0.044	0.978	0.109	0.096	0.013	0.106	0.000	2.353
Study A (indicator-skew DGP)	+-	200	0.3	EI (Indicator-Exponential)	phi22	90	90	1	-0.091	0.944	0.131	0.112	0.020	0.144	0.000	2.353
Study A (indicator-skew DGP)	+-	200	0.3	EI (Indicator-Exponential)	rho	90	90	1	0.143	0.311	0.223	0.572	-0.350	0.590	0.000	2.353
Study A (indicator-skew DGP)	+-	200	0.3	EL (Latent-Exponential)	mu[1]	90	90	1	0.095	0.922	0.257	0.212	0.045	0.232	0.000	7.723
Study A (indicator-skew DGP)	+-	200	0.3	EL (Latent-Exponential)	mu[2]	90	90	1	-0.091	0.933	0.248	0.212	0.037	0.230	0.000	7.723
Study A (indicator-skew DGP)	+-	200	0.3	EL (Latent-Exponential)	phi11	90	90	1	-0.304	0.100	0.052	0.176	-0.125	0.351	0.000	7.723
Study A (indicator-skew DGP)	+-	200	0.3	EL (Latent-Exponential)	phi12	90	90	1	-0.081	0.489	0.070	0.202	-0.132	0.218	0.000	7.723

sem_study	direction	T	rho	Model	param	N_expected	N_ok	prop_ok	mean_bias	coverage_95	mean_post_sd	emp_sd	rel_bias	RMSE	mean_div	mean_rhat
Study A (indicator-skew DGP)	+-	200	0.3	EL (Latent-Exponential)	phi21	90	90	1	-0.062	0.411	0.064	0.192	-0.129	0.202	0.000	7.723
Study A (indicator-skew DGP)	+-	200	0.3	EL (Latent-Exponential)	phi22	90	90	1	-0.135	0.444	0.063	0.149	-0.086	0.201	0.000	7.723
Study A (indicator-skew DGP)	+-	200	0.3	EL (Latent-Exponential)	rho	90	90	1	-0.509	0.500	0.340	0.459	-0.118	0.686	0.000	7.723
Study B (latent-skew DGP)	+-	200	0.3	EI (Indicator-Exponential)	mu[1]	90	90	1	0.111	0.867	0.110	0.080	0.030	0.137	0.000	19.574
Study B (latent-skew DGP)	+-	200	0.3	EI (Indicator-Exponential)	mu[2]	90	90	1	-0.210	0.689	0.144	0.106	0.038	0.235	0.000	19.574
Study B (latent-skew DGP)	+-	200	0.3	EI (Indicator-Exponential)	phi11	90	90	1	-0.014	0.989	0.090	0.064	0.026	0.066	0.000	19.574
Study B (latent-skew DGP)	+-	200	0.3	EI (Indicator-Exponential)	phi12	90	90	1	-0.012	1.000	0.128	0.075	0.054	0.076	0.000	19.574
Study B (latent-skew DGP)	+-	200	0.3	EI (Indicator-Exponential)	phi21	90	90	1	-0.002	1.000	0.099	0.048	0.051	0.048	0.000	19.574
Study B (latent-skew DGP)	+-	200	0.3	EI (Indicator-Exponential)	phi22	90	90	1	-0.027	1.000	0.122	0.065	0.057	0.070	0.000	19.574
Study B (latent-skew DGP)	+-	200	0.3	EI (Indicator-Exponential)	rho	90	90	1	0.188	0.600	0.504	0.453	0.051	0.490	0.000	19.574

sem_study	direction	T	n_rho	Model	param	N_exp	N_ctrl	ndraws	bias	mean_ci_width	coverage_95	post_sd	rhat_max	RMSE	mean_rhat	min_rhat
Study B (latent-skew DGP)	+-	200	0.3	EL (Latent-Exponential)	mu[1]	90	90	1	0.175	0.478	0.094	0.066	0.029	0.187	1.000	1.001
Study B (latent-skew DGP)	+-	200	0.3	EL (Latent-Exponential)	mu[2]	90	90	1	-0.187	0.400	0.094	0.072	0.023	0.200	1.000	1.001
Study B (latent-skew DGP)	+-	200	0.3	EL (Latent-Exponential)	phi11	90	90	1	-0.003	1.000	0.024	0.017	0.007	0.017	1.000	1.001
Study B (latent-skew DGP)	+-	200	0.3	EL (Latent-Exponential)	phi12	90	90	1	0.003	1.000	0.029	0.019	0.010	0.019	1.000	1.001
Study B (latent-skew DGP)	+-	200	0.3	EL (Latent-Exponential)	phi21	90	90	1	0.002	1.000	0.024	0.016	0.007	0.016	1.000	1.001
Study B (latent-skew DGP)	+-	200	0.3	EL (Latent-Exponential)	phi22	90	90	1	-0.005	1.000	0.030	0.019	0.011	0.019	1.000	1.001
Study B (latent-skew DGP)	+-	200	0.3	EL (Latent-Exponential)	rho	90	90	1	0.333	0.022	0.053	0.046	0.007	0.336	1.000	1.001

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Tables written to: results_sem/exported_tables_s5
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