Table 1: Power and type I error probability (α) for fixed effects analysis. The target significance level is 0.05. NM is no missingness, MI is multiple imputation using gamma meta-regression, ME is mean imputation, SGR is single imputation using gamma meta-regression, SLM is single imputation using linear regression based on the log-variance, and CC is complete case analysis.

	$\beta_1 = 0$		$\beta_1 = 0.75$		$\beta_1 = 1.5$	
10% missing	*Power*	α	*Power*	α	*Power*	α
NM	0.98	0.05	0.54	0.05	0.25	0.05
MI	0.98	0.05	0.54	0.05	0.25	0.05
ME	0.98	0.05	0.53	0.06	0.24	0.05
SGR	0.98	0.05	0.54	0.05	0.25	0.05
SLM	0.98	0.05	0.54	0.05	0.25	0.05
CC	0.97	0.05	0.50	0.05	0.23	0.05
25 % missing	*Power*	α	*Power*	α	*Power*	α
NM	0.98	0.05	0.54	0.05	0.25	0.05
MI	0.98	0.05	0.54	0.05	0.25	0.05
ME	0.98	0.05	0.54	0.07	0.26	0.07
SGR	0.98	0.05	0.54	0.05	0.25	0.05
SLM	0.98	0.05	0.54	0.05	0.25	0.05
CC	0.94	0.05	0.46	0.05	0.22	0.05
40 % missing	Power	α	Power	α	Power	α
NM	0.98	0.05	0.54	0.05	0.26	0.06
MI	0.98	0.05	0.54	0.05	0.25	0.05
ME	0.98	0.05	0.56	0.08	0.28	0.10
SGR	0.98	0.05	0.54	0.05	0.25	0.05
SLM	0.98	0.05	0.54	0.05	0.25	0.05
CC	0.88	0.05	0.41	0.05	0.22	0.05

Table 2: Confidence interval width, coverage probability, estimation bias, estimated standard error, estimated mean square error, and empirical standard error for fixed effects analysis, and 10% missingness in sample variances. NM is no missingness, MI is multiple imputation using gamma meta-regression, ME is mean imputation, SGR is single imputation using gamma meta-regression, SLM is single imputation using linear regression based on the log-variance, and CC is complete case analysis.

$\beta_1 = 0$	Width	Coverage	Bias	Estimated SE	Estimated MSE	Empirical SE
NM	0.0961	0.946	0.0001	0.0245	0.0012	0.0249
MI	0.0966	0.950	0.0001	0.0246	0.0012	0.0247
ME	0.0962	0.947	0.0001	0.0245	0.0012	0.0249
SGR	0.0966	0.950	0.0001	0.0246	0.0012	0.0247
SLM	0.0966	0.950	0.0001	0.0246	0.0012	0.0247
CC	0.1019	0.949	0.0000	0.0260	0.0014	0.0261
$\beta_1 = 0.75$	Width	Coverage	Bias	Estimated SE	Estimated MSE	Empirical SE
NM	0.1899	0.946	0.0001	0.0485	0.0047	0.0490
MI	0.1908	0.949	0.0001	0.0487	0.0047	0.0487
ME	0.1917	0.944	0.0001	0.0489	0.0049	0.0498
SGR	0.1908	0.949	0.0001	0.0487	0.0047	0.0487
SLM	0.1908	0.949	0.0001	0.0487	0.0047	0.0487
CC	0.1994	0.950	0.0000	0.0509	0.0052	0.0509
$\beta_1 = 1.5$	Width	Coverage	Bias	Estimated SE	Estimated MSE	Empirical SE
NM	0.3027	0.950	0.0000	0.0772	0.0120	0.0779
MI	0.3040	0.951	-0.0001	0.0775	0.0120	0.0775
ME	0.3113	0.946	-0.0001	0.0794	0.0128	0.0808
SGR	0.3039	0.951	-0.0001	0.0775	0.0120	0.0775
SLM	0.3039	0.951	-0.0001	0.0775	0.0120	0.0775
CC	0.3157	0.951	-0.0003	0.0805	0.0130	0.0806

Table 3: Confidence interval width, coverage probability, estimation bias, estimated standard error, estimated mean square error, and empirical standard error for fixed effects analysis, and 25% missingness in sample variances. NM is no missingness, MI is multiple imputation using gamma meta-regression, ME is mean imputation, SGR is single imputation using gamma meta-regression, SLM is single imputation using linear regression based on the log-variance, and CC is complete case analysis.

$\beta_1 = 0$	Width	Coverage	Bias	Estimated SE	Estimated MSE	Empirical SE
NM	0.096	0.948	0.0001	0.0245	0.0012	0.0247
MI	0.097	0.951	0.0001	0.0246	0.0012	0.0246
ME	0.096	0.948	0.0001	0.0246	0.0012	0.0247
SGR	0.097	0.950	0.0001	0.0246	0.0012	0.0246
SLM	0.097	0.951	0.0001	0.0246	0.0012	0.0246
CC	0.112	0.950	0.0002	0.0285	0.0016	0.0284
$\beta_1 = 0.75$	Width	Coverage	Bias	Estimated SE	Estimated MSE	Empirical SE
NM	0.1899	0.949	0.0000	0.0485	0.0047	0.0489
MI	0.1908	0.952	0.0000	0.0487	0.0047	0.0487
ME	0.1892	0.935	-0.0001	0.0483	0.0050	0.0513
SGR	0.1908	0.952	0.0000	0.0487	0.0047	0.0487
SLM	0.1908	0.952	0.0000	0.0487	0.0047	0.0487
CC	0.2102	0.950	0.0002	0.0536	0.0057	0.0535
$\beta_1 = 1.5$	Width	Coverage	Bias	Estimated SE	Estimated MSE	Empirical SE
NM	0.3026	0.949	-0.0004	0.0772	0.0121	0.0780
MI	0.3040	0.951	-0.0003	0.0775	0.0120	0.0777
ME	0.3124	0.932	-0.0006	0.0797	0.0137	0.0857
SGR	0.3039	0.951	-0.0003	0.0775	0.0120	0.0777
SLM	0.3039	0.951	-0.0003	0.0775	0.0120	0.0777
CC	0.3245	0.951	-0.0002	0.0828	0.0137	0.0829

Table 4: Confidence interval width, coverage probability, estimation bias, estimated standard error, estimated mean square error, and empirical standard error for fixed effects analysis, and 40% missingness in sample variances. NM is no missingness, MI is multiple imputation using gamma meta-regression, ME is mean imputation, SGR is single imputation using gamma meta-regression, SLM is single imputation using linear regression based on the log-variance, and CC is complete case analysis.

$\beta_1 = 0$	Width	Coverage	Bias	Estimated SE	Estimated MSE	Empirical SE
NM	0.0961	0.950	0.0002	0.0245	0.0012	0.0247
MI	0.0966	0.951	0.0002	0.0246	0.0012	0.0246
ME	0.0963	0.950	0.0002	0.0246	0.0012	0.0247
SGR	0.0966	0.951	0.0002	0.0246	0.0012	0.0246
SLM	0.0966	0.951	0.0002	0.0246	0.0012	0.0246
CC	0.1249	0.951	0.0001	0.0319	0.0020	0.0319
$\beta_1 = 0.75$	Width	Coverage	Bias	Estimated SE	Estimated MSE	Empirical SE
NM	0.1899	0.948	0.0003	0.0485	0.0048	0.0491
MI	0.1908	0.950	0.0003	0.0487	0.0048	0.0490
ME	0.1841	0.917	0.0004	0.0470	0.0050	0.0530
SGR	0.1908	0.949	0.0003	0.0487	0.0048	0.0490
SLM	0.1908	0.949	0.0003	0.0487	0.0048	0.0490
CC	0.2241	0.950	0.0001	0.0572	0.0066	0.0576
$\beta_1 = 1.5$	Width	Coverage	Bias	Estimated SE	Estimated MSE	Empirical SE
NM	0.3026	0.944	0.0002	0.0772	0.0122	0.0788
MI	0.3040	0.947	0.0001	0.0775	0.0122	0.0785
ME	0.3089	0.899	0.0001	0.0788	0.0151	0.0942
SGR	0.3039	0.946	0.0001	0.0775	0.0122	0.0785
SLM	0.3039	0.947	0.0001	0.0775	0.0122	0.0785
CC	0.3353	0.946	0.0000	0.0856	0.0149	0.0868

Table 5: Power and type I error (α) rates for mixed effects analysis, and 10% missingness in sample variances. NM is no missingness, MI is multiple imputation using gamma meta-regression, ME is mean imputation, SGR is single imputation using gamma meta-regression, SLM is single imputation using linear regression based on the log-variance, and CC is complete case analysis.

	$\beta_1 = 0$		$\beta_1 = 0.75$		$\beta_1 = 1.5$	
	Power	α	Power	α	Power	α
$\tau^2 = 1$, $\tau_b^2 = 1$						
NM	0.78	0.06	0.72	0.06	0.56	0.07
MI	0.78	0.06	0.72	0.06	0.55	0.06
ME	0.78	0.06	0.72	0.06	0.55	0.07
SGR	0.78	0.06	0.72	0.06	0.56	0.07
SLM	0.78	0.06	0.72	0.06	0.56	0.07
CC	0.74	0.06	0.68	0.06	0.53	0.07
$\tau^2 = 2$, $\tau_b^2 = 1$						
NM	0.51	0.06	0.48	0.06	0.39	0.07
MI	0.51	0.06	0.48	0.06	0.38	0.06
ME	0.51	0.06	0.48	0.06	0.38	0.07
SGR	0.51	0.06	0.48	0.06	0.39	0.07
SLM	0.51	0.06	0.48	0.06	0.39	0.07
CC	0.47	0.06	0.44	0.06	0.36	0.07
$\tau^2 = 1$, $\tau_b^2 = 2$						
NM	0.78	0.07	0.71	0.07	0.56	0.07
MI	0.78	0.07	0.70	0.07	0.52	0.06
ME	0.78	0.07	0.70	0.07	0.54	0.07
SGR	0.78	0.07	0.70	0.07	0.55	0.07
SLM	0.78	0.07	0.70	0.07	0.55	0.07
CC	0.73	0.07	0.67	0.07	0.53	0.07
$\tau^2 = 2$, $\tau_b^2 = 2$						
NM	0.51	0.07	0.47	0.07	0.39	0.07
MI	0.51	0.07	0.47	0.07	0.36	0.07
ME	0.51	0.07	0.47	0.07	0.38	0.08
SGR	0.51	0.07	0.47	0.07	0.38	0.07
SLM	0.51	0.07	0.47	0.07	0.39	0.08
CC	0.48	0.07	0.44	0.07	0.36	0.08

Table 6: Power and type I error (α) rates for mixed effects analysis, and 25% missingness in sample variances. NM is no missingness, MI is multiple imputation using gamma meta-regression, ME is mean imputation, SGR is single imputation using gamma meta-regression, SLM is single imputation using linear regression based on the log-variance, and CC is complete case analysis.

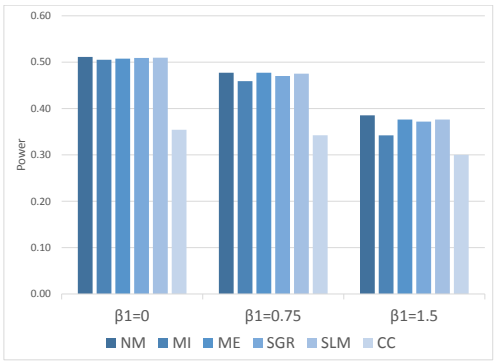
	$\beta_1 = 0$		$\beta_1 = 0.75$		$\beta_1 = 1.5$	
	Power	α	Power	α	Power	α
$\tau^2 = 1$, $\tau_b^2 = 1$						
NM	0.78	0.06	0.72	0.06	0.57	0.06
MI	0.78	0.06	0.71	0.06	0.52	0.05
ME	0.78	0.06	0.72	0.06	0.53	0.08
SGR	0.78	0.06	0.71	0.06	0.55	0.06
SLM	0.78	0.06	0.72	0.06	0.56	0.07
CC	0.67	0.07	0.62	0.07	0.48	0.06
$\tau^2 = 2$, $\tau_b^2 = 1$						
NM	0.51	0.06	0.48	0.06	0.40	0.06
MI	0.51	0.06	0.47	0.06	0.37	0.06
ME	0.52	0.06	0.48	0.06	0.38	0.08
SGR	0.52	0.06	0.48	0.06	0.38	0.07
SLM	0.52	0.06	0.48	0.06	0.39	0.07
CC	0.41	0.07	0.38	0.07	0.33	0.07
$\tau^2 = 1$, $\tau_b^2 = 2$						
NM	0.77	0.07	0.71	0.07	0.57	0.07
MI	0.77	0.06	0.67	0.06	0.46	0.05
ME	0.77	0.07	0.70	0.07	0.51	0.09
SGR	0.77	0.07	0.69	0.07	0.53	0.07
SLM	0.77	0.07	0.70	0.07	0.54	0.08
CC	0.66	0.07	0.60	0.07	0.48	0.07
$\tau^2 = 2$, $\tau_b^2 = 2$						
NM	0.51	0.07	0.47	0.07	0.39	0.07
MI	0.51	0.06	0.45	0.06	0.33	0.06
ME	0.51	0.07	0.47	0.07	0.37	0.09
SGR	0.51	0.07	0.47	0.07	0.37	0.08
SLM	0.51	0.07	0.47	0.07	0.38	0.08
CC	0.41	0.07	0.39	0.07	0.33	0.07

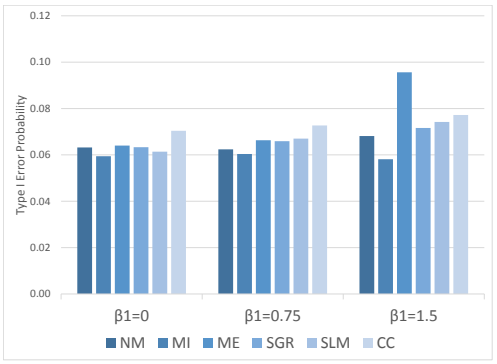
Table 7: Power and type I error probability (α) for mixed effects analysis, and 40% missingness in sample variances. The target significance level is 0.05. NM is no missingness, MI is multiple imputation using gamma meta-regression, ME is mean imputation, SGR is single imputation using gamma meta-regression, SLM is single imputation using linear regression based on the log-variance, and CC is complete case analysis.

	$\beta_1 = 0$		$\beta_1 = 0.75$		$\beta_1 = 1.5$	
	Power	α	*Power*	α	*Power*	α
$\tau^2 = 1$, $\tau_b^2 = 1$						
NM	0.78	0.06	0.72	0.07	0.56	0.07
MI	0.78	0.06	0.70	0.06	0.49	0.05
ME	0.78	0.06	0.72	0.07	0.50	0.10
SGR	0.78	0.06	0.71	0.06	0.54	0.07
SLM	0.79	0.06	0.72	0.07	0.55	0.07
CC	0.58	0.07	0.53	0.07	0.44	0.08
$\tau^2 = 2$, $\tau_b^2 = 1$						
NM	0.51	0.06	0.48	0.06	0.39	0.07
MI	0.51	0.06	0.46	0.06	0.34	0.06
ME	0.51	0.06	0.48	0.07	0.38	0.10
SGR	0.51	0.06	0.47	0.07	0.37	0.07
SLM	0.51	0.06	0.48	0.07	0.38	0.07
CC	0.35	0.07	0.34	0.07	0.30	0.08
$\tau^2 = 1$, $\tau_b^2 = 2$						
NM	0.78	0.06	0.72	0.06	0.57	0.07
MI	0.77	0.06	0.66	0.05	0.42	0.05
ME	0.78	0.07	0.70	0.08	0.50	0.11
SGR	0.78	0.07	0.68	0.07	0.52	0.08
SLM	0.78	0.06	0.70	0.07	0.53	0.09
CC	0.58	0.07	0.53	0.08	0.44	0.08
$\tau^2 = 2$, $\tau_b^2 = 2$						
NM	0.52	0.06	0.49	0.06	0.40	0.07
MI	0.51	0.06	0.45	0.06	0.31	0.05
ME	0.52	0.07	0.48	0.07	0.38	0.11
SGR	0.52	0.07	0.47	0.07	0.37	0.08
SLM	0.52	0.07	0.48	0.07	0.39	0.09
CC	0.36	0.08	0.34	0.08	0.30	0.08

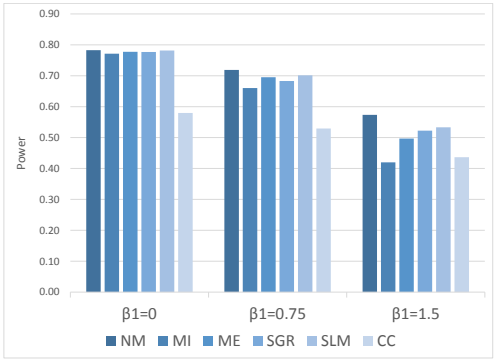
Figure 1: Power and type I error probability (α) for mixed effects analysis, and 40% missingness in sample variances when $\tau^2 = 2, \tau_b^2 = 1$ and $\tau^2 = 1, \tau_b^2 = 2$. The target significance level is 0.05. NM is no missingness, MI is multiple imputation using gamma meta-regression, ME is mean imputation, SGR is single imputation using gamma meta-regression, SLM is single imputation using linear regression based on the log-variance, and CC is complete case analysis.

$$\tau^2 = 2, \tau_b^2 = 1$$





$$\tau^2 = 1, \tau_b^2 = 2$$



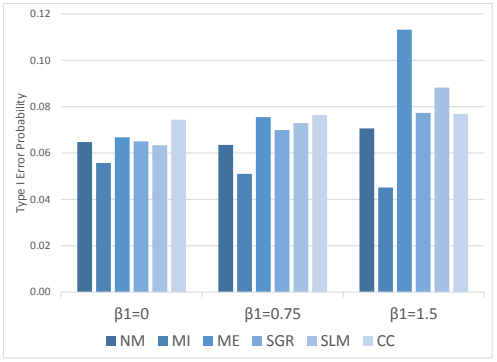


Table 8: Confidence interval width, coverage probability, estimation bias, estimated standard error, estimated mean square error, and empirical standard error for mixed effects analysis, and 10% missingness in sample variances for $\beta_1 = 0$. NM is no missingness, MI is multiple imputation using gamma meta-regression, ME is mean imputation, SGR is single imputation using gamma meta-regression, SLM is single imputation using linear regression based on the log-variance, and CC is complete case analysis.

$\beta_1 = 0$	Width	Coverage	Bias	Estimated SE	Estimated MSE	Empirical SE
$\tau^2 = 1$, $\tau_b^2 = 1$						
NM	0.5628	0.942	-0.0011	0.1436	0.0417	0.1435
MI	0.5638	0.942	-0.0011	0.1438	0.0417	0.1435
ME	0.5626	0.942	-0.0010	0.1435	0.0416	0.1435
SGR	0.5626	0.942	-0.0011	0.1435	0.0417	0.1435
SLM	0.5626	0.942	-0.0011	0.1435	0.0416	0.1435
CC	0.5931	0.938	-0.0015	0.1513	0.0465	0.1519
$\tau^2 = 2$, $\tau_b^2 = 1$						
NM	0.7866	0.941	-0.0016	0.2007	0.0814	0.2007
MI	0.7874	0.941	-0.0015	0.2009	0.0815	0.2007
ME	0.7862	0.941	-0.0015	0.2006	0.0814	0.2007
SGR	0.7863	0.942	-0.0015	0.2006	0.0814	0.2007
SLM	0.7864	0.941	-0.0015	0.2006	0.0814	0.2007
CC	0.8291	0.938	-0.0022	0.2115	0.0910	0.2124
$\tau^2 = 1$, $\tau_b^2 = 2$						
NM	0.5632	0.930	-0.0001	0.1437	0.0427	0.1464
MI	0.5664	0.933	-0.0001	0.1445	0.0430	0.1465
ME	0.5633	0.931	-0.0001	0.1437	0.0430	0.1465
SGR	0.5634	0.932	-0.0001	0.1437	0.0428	0.1465
SLM	0.5630	0.931	-0.0001	0.1436	0.0428	0.1465
CC	0.5936	0.932	-0.0001	0.1514	0.0477	0.1547
$\tau^2 = 2$, $\tau_b^2 = 2$						
NM	0.7844	0.929	0.0001	0.2001	0.0831	0.2041
MI	0.7872	0.932	0.0001	0.2008	0.0833	0.2042
ME	0.7840	0.930	0.0001	0.2000	0.0831	0.2042
SGR	0.7842	0.929	0.0001	0.2000	0.0831	0.2042
SLM	0.7842	0.930	0.0001	0.2000	0.0830	0.2042
CC	0.8266	0.931	0.0001	0.2109	0.0926	0.2156

Table 9: Confidence interval width, coverage probability, estimation bias, estimated standard error, estimated mean square error, and empirical standard error for mixed effects analysis, and 10% missingness in sample variances for $\beta_1 = 0.75$. NM is no missingness, MI is multiple imputation using gamma meta-regression, ME is mean imputation, SGR is single imputation using gamma meta-regression, SLM is single imputation using linear regression based on the log-variance, and CC is complete case analysis.

$\beta_1 = 0.75$	Width	Coverage	Bias	Estimated SE	Estimated MSE	Empirical SE
$\tau^2 = 1$, $\tau_b^2 = 1$						
NM	0.6082	0.940	-0.0011	0.1552	0.0489	0.1557
MI	0.6129	0.942	-0.0010	0.1563	0.0493	0.1561
ME	0.6094	0.940	-0.0010	0.1555	0.0492	0.1564
SGR	0.6094	0.940	-0.0010	0.1555	0.0491	0.1561
SLM	0.6082	0.941	-0.0010	0.1552	0.0490	0.1561
CC	0.6396	0.937	-0.0012	0.1632	0.0543	0.1642
$\tau^2 = 2$, $\tau_b^2 = 1$						
NM	0.8236	0.940	-0.0016	0.2101	0.0897	0.2108
MI	0.8269	0.943	-0.0014	0.2110	0.0901	0.2110
ME	0.8236	0.940	-0.0014	0.2101	0.0898	0.2111
SGR	0.8241	0.940	-0.0014	0.2102	0.0898	0.2110
SLM	0.8230	0.941	-0.0015	0.2100	0.0897	0.2110
CC	0.8667	0.937	-0.0018	0.2211	0.0998	0.2225
$\tau^2 = 1$, $\tau_b^2 = 2$						
NM	0.6138	0.932	-0.0003	0.1566	0.0508	0.1598
MI	0.6258	0.935	-0.0005	0.1597	0.0522	0.1612
ME	0.6178	0.931	-0.0003	0.1576	0.0517	0.1614
SGR	0.6179	0.930	-0.0004	0.1576	0.0516	0.1612
SLM	0.6147	0.929	-0.0005	0.1568	0.0514	0.1615
CC	0.6458	0.930	-0.0003	0.1648	0.0566	0.1688
$\tau^2 = 2$, $\tau_b^2 = 2$						
NM	0.8292	0.929	-0.0001	0.2115	0.0930	0.2161
MI	0.8386	0.932	-0.0002	0.2139	0.0943	0.2170
ME	0.8314	0.929	-0.0001	0.2121	0.0937	0.2171
SGR	0.8321	0.930	-0.0002	0.2123	0.0938	0.2172
SLM	0.8291	0.929	-0.0002	0.2115	0.0934	0.2172
CC	0.8730	0.929	0.0000	0.2227	0.1036	0.2283

Table 10: Confidence interval width, coverage probability, estimation bias, estimated standard error, estimated mean square error, and empirical standard error for mixed effects analysis, and 10% missingness in sample variances for $\beta_1 = 1.5$. NM is no missingness, MI is multiple imputation using gamma meta-regression, ME is mean imputation, SGR is single imputation using gamma meta-regression, SLM is single imputation using linear regression based on the log-variance, and CC is complete case analysis.

$\beta_1 = 1.5$	Width	Coverage	Bias	Estimated SE	Estimated MSE	Empirical SE
$\tau^2 = 1$, $\tau_b^2 = 1$						
NM	0.7358	0.935	-0.0005	0.1877	0.0727	0.1909
MI	0.7539	0.937	-0.0006	0.1923	0.0752	0.1929
ME	0.7549	0.930	-0.0007	0.1926	0.0781	0.1998
SGR	0.7414	0.932	-0.0006	0.1891	0.0738	0.1923
SLM	0.7398	0.932	-0.0007	0.1887	0.0737	0.1926
CC	0.7702	0.931	-0.0007	0.1965	0.0798	0.1999
$\tau^2 = 2$, $\tau_b^2 = 1$						
NM	0.9482	0.934	-0.0011	0.2419	0.1207	0.2457
MI	0.9624	0.936	-0.0012	0.2455	0.1233	0.2473
ME	0.9640	0.930	-0.0013	0.2459	0.1269	0.2541
SGR	0.9531	0.933	-0.0011	0.2431	0.1220	0.2469
SLM	0.9502	0.933	-0.0012	0.2424	0.1217	0.2472
CC	0.9937	0.929	-0.0013	0.2535	0.1330	0.2578
$\tau^2 = 1$, $\tau_b^2 = 2$						
NM	0.7360	0.929	-0.0008	0.1878	0.0739	0.1935
MI	0.7823	0.939	-0.0011	0.1996	0.0814	0.2003
ME	0.7599	0.925	-0.0006	0.1939	0.0804	0.2037
SGR	0.7479	0.927	-0.0007	0.1908	0.0766	0.1974
SLM	0.7452	0.925	-0.0009	0.1901	0.0772	0.1997
CC	0.7711	0.926	-0.0006	0.1967	0.0815	0.2033
$\tau^2 = 2$, $\tau_b^2 = 2$						
NM	0.9536	0.928	-0.0006	0.2433	0.1245	0.2511
MI	0.9903	0.933	-0.0009	0.2526	0.1321	0.2567
ME	0.9758	0.924	-0.0003	0.2489	0.1326	0.2612
SGR	0.9650	0.926	-0.0005	0.2462	0.1279	0.2548
SLM	0.9593	0.924	-0.0007	0.2446	0.1280	0.2567
CC	1.0003	0.923	-0.0003	0.2552	0.1376	0.2640

Table 11: Confidence interval width, coverage probability, estimation bias, estimated standard error, estimated mean square error, and empirical standard error for mixed effects analysis, and 25% missingness in sample variances for $\beta_1 = 0$. NM is no missingness, MI is multiple imputation using gamma meta-regression, ME is mean imputation, SGR is single imputation using gamma meta-regression, SLM is single imputation using linear regression based on the log-variance, and CC is complete case analysis.

$\beta_1 = 0$	Width	Coverage	Bias	Estimated SE	Estimated MSE	Empirical SE
$\tau^2 = 1$, $\tau_b^2 = 1$						
NM	0.5627	0.940	0.0004	0.1436	0.0420	0.1447
MI	0.5659	0.943	0.0004	0.1444	0.0422	0.1448
ME	0.5631	0.939	0.0004	0.1437	0.0421	0.1448
SGR	0.5632	0.940	0.0004	0.1437	0.0421	0.1448
SLM	0.5631	0.941	0.0005	0.1436	0.0420	0.1448
CC	0.6499	0.935	-0.0004	0.1658	0.0564	0.1676
$\tau^2 = 2$, $\tau_b^2 = 1$						
NM	0.7867	0.940	0.0005	0.2007	0.0821	0.2023
MI	0.7894	0.941	0.0005	0.2014	0.0823	0.2023
ME	0.7869	0.938	0.0005	0.2007	0.0821	0.2023
SGR	0.7870	0.940	0.0005	0.2008	0.0821	0.2023
SLM	0.7872	0.941	0.0005	0.2008	0.0821	0.2023
CC	0.9085	0.935	-0.0008	0.2318	0.1102	0.2343
$\tau^2 = 1$, $\tau_b^2 = 2$						
NM	0.5644	0.932	-0.0009	0.1440	0.0426	0.1457
MI	0.5717	0.938	-0.0009	0.1459	0.0432	0.1460
ME	0.5650	0.932	-0.0010	0.1441	0.0429	0.1460
SGR	0.5655	0.932	-0.0009	0.1443	0.0429	0.1461
SLM	0.5642	0.932	-0.0009	0.1439	0.0427	0.1461
CC	0.6506	0.927	-0.0019	0.1660	0.0571	0.1683
$\tau^2 = 2$, $\tau_b^2 = 2$						
NM	0.7861	0.932	-0.0015	0.2005	0.0828	0.2030
MI	0.7924	0.936	-0.0015	0.2021	0.0833	0.2032
ME	0.7857	0.931	-0.0015	0.2004	0.0830	0.2032
SGR	0.7862	0.931	-0.0015	0.2006	0.0830	0.2032
SLM	0.7858	0.932	-0.0015	0.2005	0.0828	0.2032
CC	0.9061	0.928	-0.0029	0.2312	0.1108	0.2344

Table 12: Confidence interval width, coverage probability, estimation bias, estimated standard error, estimated mean square error, and empirical standard error for mixed effects analysis, and 25% missingness in sample variances for $\beta_1 = 0.75$. NM is no missingness, MI is multiple imputation using gamma meta-regression, ME is mean imputation, SGR is single imputation using gamma meta-regression, SLM is single imputation using linear regression based on the log-variance, and CC is complete case analysis.

$\beta_1 = 0.75$	Width	Coverage	Bias	Estimated SE	Estimated MSE	Empirical SE
$\tau^2 = 1$, $\tau_b^2 = 1$						
NM	0.6079	0.939	0.0009	0.1551	0.0491	0.1567
MI	0.6212	0.944	0.0006	0.1585	0.0506	0.1582
ME	0.6108	0.937	0.0006	0.1558	0.0502	0.1591
SGR	0.6129	0.941	0.0006	0.1564	0.0501	0.1583
SLM	0.6093	0.938	0.0006	0.1554	0.0498	0.1584
CC	0.6953	0.935	-0.0003	0.1774	0.0646	0.1795
$\tau^2 = 2$, $\tau_b^2 = 1$						
NM	0.8234	0.939	0.0009	0.2101	0.0903	0.2122
MI	0.8334	0.942	0.0007	0.2126	0.0916	0.2131
ME	0.8239	0.937	0.0007	0.2102	0.0910	0.2137
SGR	0.8268	0.938	0.0007	0.2109	0.0911	0.2132
SLM	0.8233	0.938	0.0007	0.2100	0.0907	0.2133
CC	0.9449	0.933	-0.0006	0.2411	0.1196	0.2441
$\tau^2 = 1$, $\tau_b^2 = 2$						
NM	0.6132	0.931	-0.0004	0.1564	0.0504	0.1584
MI	0.6430	0.942	-0.0004	0.1640	0.0542	0.1631
ME	0.6212	0.926	-0.0004	0.1585	0.0529	0.1641
SGR	0.6248	0.929	-0.0004	0.1594	0.0528	0.1628
SLM	0.6160	0.927	-0.0003	0.1571	0.0523	0.1637
CC	0.7002	0.932	-0.0017	0.1786	0.0662	0.1816
$\tau^2 = 2$, $\tau_b^2 = 2$						
NM	0.8287	0.929	-0.0010	0.2114	0.0923	0.2144
MI	0.8517	0.936	-0.0009	0.2173	0.0960	0.2177
ME	0.8319	0.927	-0.0009	0.2122	0.0944	0.2182
SGR	0.8372	0.927	-0.0009	0.2136	0.0948	0.2179
SLM	0.8281	0.926	-0.0009	0.2113	0.0938	0.2181
CC	0.9487	0.928	-0.0026	0.2420	0.1219	0.2463

Table 13: Confidence interval width, coverage probability, estimation bias, estimated standard error, estimated mean square error, and empirical standard error for mixed effects analysis, and 25% missingness in sample variances for $\beta_1 = 1.5$. NM is no missingness, MI is multiple imputation using gamma meta-regression, ME is mean imputation, SGR is single imputation using gamma meta-regression, SLM is single imputation using linear regression based on the log-variance, and CC is complete case analysis.

$\beta_1 = 1.5$	Width	Coverage	Bias	Estimated SE	Estimated MSE	Empirical SE
$\tau^2 = 1$, $\tau_b^2 = 1$						
NM	0.7351	0.937	0.0019	0.1875	0.0727	0.1912
MI	0.7846	0.948	0.0009	0.2001	0.0806	0.1989
ME	0.7844	0.923	0.0009	0.2001	0.0904	0.2218
SGR	0.7511	0.937	0.0009	0.1916	0.0763	0.1965
SLM	0.7474	0.934	0.0009	0.1907	0.0765	0.1978
CC	0.8198	0.936	0.0003	0.2091	0.0908	0.2133
$\tau^2 = 2$, $\tau_b^2 = 1$						
NM	0.9476	0.936	0.0020	0.2417	0.1209	0.2462
MI	0.9873	0.942	0.0010	0.2519	0.1291	0.2529
ME	0.9823	0.921	0.0010	0.2506	0.1397	0.2737
SGR	0.9627	0.935	0.0010	0.2456	0.1254	0.2513
SLM	0.9550	0.932	0.0010	0.2436	0.1248	0.2523
CC	1.0641	0.934	-0.0001	0.2715	0.1531	0.2766
$\tau^2 = 1$, $\tau_b^2 = 2$						
NM	0.7335	0.928	0.0004	0.1871	0.0727	0.1907
MI	0.8491	0.949	0.0002	0.2166	0.0938	0.2119
ME	0.7919	0.911	0.0007	0.2020	0.0963	0.2322
SGR	0.7638	0.927	-0.0003	0.1948	0.0799	0.2014
SLM	0.7572	0.917	0.0002	0.1932	0.0821	0.2086
CC	0.8190	0.928	-0.0016	0.2089	0.0913	0.2137
$\tau^2 = 2$, $\tau_b^2 = 2$						
NM	0.9505	0.926	-0.0001	0.2425	0.1224	0.2474
MI	1.0438	0.939	-0.0004	0.2663	0.1443	0.2661
ME	0.9976	0.909	0.0002	0.2545	0.1499	0.2873
SGR	0.9803	0.924	-0.0008	0.2501	0.1319	0.2583
SLM	0.9649	0.917	-0.0004	0.2462	0.1328	0.2644
CC	1.0672	0.928	-0.0027	0.2722	0.1555	0.2787

Table 14: Confidence interval width, coverage probability, estimation bias, estimated standard error, estimated mean square error, and empirical standard error for mixed effects analysis, and 40% missingness in sample variances for $\beta_1 = 0$. NM is no missingness, MI is multiple imputation using gamma meta-regression, ME is mean imputation, SGR is single imputation using gamma meta-regression, SLM is single imputation using linear regression based on the log-variance, and CC is complete case analysis.

$\beta_1 = 0$	Width	Coverage	Bias	Estimated SE	Estimated MSE	Empirical SE
$\tau^2 = 1$, $\tau_b^2 = 1$						
NM	0.5614	0.939	-0.0024	0.1432	0.0418	0.1443
MI	0.5667	0.942	-0.0024	0.1446	0.0421	0.1445
ME	0.5616	0.937	-0.0023	0.1433	0.0419	0.1445
SGR	0.5620	0.936	-0.0023	0.1434	0.0419	0.1445
SLM	0.5619	0.938	-0.0024	0.1434	0.0418	0.1445
CC	0.7234	0.930	-0.0009	0.1846	0.0710	0.1888
$\tau^2 = 2$, $\tau_b^2 = 1$						
NM	0.7847	0.937	-0.0034	0.2002	0.0817	0.2019
MI	0.7894	0.941	-0.0034	0.2014	0.0821	0.2020
ME	0.7846	0.936	-0.0034	0.2002	0.0818	0.2020
SGR	0.7849	0.937	-0.0034	0.2002	0.0818	0.2020
SLM	0.7854	0.939	-0.0034	0.2004	0.0818	0.2020
CC	1.0111	0.930	-0.0015	0.2579	0.1387	0.2639
$\tau^2 = 1$, $\tau_b^2 = 2$						
NM	0.5633	0.935	0.0016	0.1437	0.0425	0.1454
MI	0.5763	0.944	0.0016	0.1470	0.0434	0.1459
ME	0.5644	0.933	0.0016	0.1440	0.0428	0.1460
SGR	0.5656	0.935	0.0015	0.1443	0.0429	0.1460
SLM	0.5641	0.937	0.0016	0.1439	0.0426	0.1459
CC	0.7257	0.926	0.0014	0.1851	0.0715	0.1883
$\tau^2 = 2$, $\tau_b^2 = 2$						
NM	0.7845	0.935	0.0021	0.2001	0.0825	0.2025
MI	0.7962	0.942	0.0021	0.2031	0.0833	0.2028
ME	0.7840	0.932	0.0021	0.2000	0.0827	0.2028
SGR	0.7852	0.933	0.0021	0.2003	0.0828	0.2028
SLM	0.7853	0.935	0.0022	0.2003	0.0825	0.2028
CC	1.0105	0.924	0.0018	0.2578	0.1390	0.2624

Table 15: Confidence interval width, coverage probability, estimation bias, estimated standard error, estimated mean square error, and empirical standard error for mixed effects analysis, and 40% missingness in sample variances for $\beta_1 = 0.75$. NM is no missingness, MI is multiple imputation using gamma meta-regression, ME is mean imputation, SGR is single imputation using gamma meta-regression, SLM is single imputation using linear regression based on the log-variance, and CC is complete case analysis.

$\beta_1 = 0.75$	Width	Coverage	Bias	Estimated SE	Estimated MSE	Empirical SE
$\tau^2 = 1$, $\tau_b^2 = 1$						
NM	0.6060	0.938	-0.0022	0.1546	0.0488	0.1559
MI	0.6277	0.944	-0.0019	0.1601	0.0512	0.1584
ME	0.6097	0.933	-0.0018	0.1555	0.0503	0.1597
SGR	0.6141	0.935	-0.0018	0.1567	0.0503	0.1587
SLM	0.6088	0.935	-0.0020	0.1553	0.0498	0.1586
CC	0.7671	0.929	-0.0003	0.1957	0.0803	0.2015
$\tau^2 = 2$, $\tau_b^2 = 1$						
NM	0.8205	0.938	-0.0032	0.2093	0.0896	0.2113
MI	0.8375	0.940	-0.0029	0.2137	0.0920	0.2130
ME	0.8206	0.934	-0.0028	0.2093	0.0906	0.2137
SGR	0.8260	0.934	-0.0028	0.2107	0.0911	0.2133
SLM	0.8210	0.933	-0.0029	0.2094	0.0904	0.2131
CC	1.0453	0.927	-0.0007	0.2667	0.1493	0.2743
$\tau^2 = 1$, $\tau_b^2 = 2$						
NM	0.6136	0.937	0.0022	0.1565	0.0506	0.1590
MI	0.6629	0.949	0.0018	0.1691	0.0566	0.1653
ME	0.6248	0.925	0.0016	0.1594	0.0543	0.1672
SGR	0.6330	0.930	0.0014	0.1615	0.0545	0.1657
SLM	0.6204	0.927	0.0018	0.1583	0.0535	0.1663
CC	0.7756	0.924	0.0017	0.1979	0.0818	0.2016
$\tau^2 = 2$, $\tau_b^2 = 2$						
NM	0.8290	0.935	0.0028	0.2115	0.0924	0.2146
MI	0.8682	0.943	0.0025	0.2215	0.0982	0.2187
ME	0.8326	0.925	0.0023	0.2124	0.0954	0.2200
SGR	0.8435	0.931	0.0022	0.2152	0.0964	0.2195
SLM	0.8304	0.930	0.0025	0.2118	0.0947	0.2194
CC	1.0539	0.923	0.0023	0.2689	0.1513	0.2739

Table 16: Confidence interval width, coverage probability, estimation bias, estimated standard error, estimated mean square error, and empirical standard error for mixed effects analysis, and 40% missingness in sample variances for $\beta_1 = 1.5$. NM is no missingness, MI is multiple imputation using gamma meta-regression, ME is mean imputation, SGR is single imputation using gamma meta-regression, SLM is single imputation using linear regression based on the log-variance, and CC is complete case analysis.

$\beta_1 = 1.5$	Width	Coverage	Bias	Estimated SE	Estimated MSE	Empirical SE
$\tau^2 = 1$, $\tau_b^2 = 1$						
NM	0.7330	0.933	-0.0017	0.1870	0.0725	0.1912
MI	0.8113	0.947	-0.0015	0.2070	0.0850	0.2027
ME	0.8118	0.902	0.0002	0.2071	0.1037	0.2438
SGR	0.7598	0.931	-0.0010	0.1938	0.0789	0.2007
SLM	0.7541	0.929	-0.0014	0.1923	0.0786	0.2016
CC	0.8841	0.925	0.0005	0.2255	0.1088	0.2362
$\tau^2 = 2$, $\tau_b^2 = 1$						
NM	0.9447	0.932	-0.0026	0.2410	0.1205	0.2462
MI	1.0083	0.942	-0.0022	0.2572	0.1335	0.2563
ME	0.9948	0.904	-0.0008	0.2538	0.1510	0.2907
SGR	0.9695	0.928	-0.0016	0.2473	0.1283	0.2553
SLM	0.9578	0.926	-0.0021	0.2442	0.1268	0.2557
CC	1.1546	0.923	0.0003	0.2946	0.1856	0.3077
$\tau^2 = 1$, $\tau_b^2 = 2$						
NM	0.7346	0.929	0.0029	0.1874	0.0738	0.1935
MI	0.9204	0.955	0.0014	0.2348	0.1093	0.2272
ME	0.8343	0.887	0.0008	0.2128	0.1208	0.2709
SGR	0.7868	0.923	0.0008	0.2007	0.0873	0.2130
SLM	0.7768	0.912	0.0011	0.1982	0.0906	0.2234
CC	0.7768	0.923	0.0022	0.2267	0.1093	0.2349
$\tau^2 = 2$, $\tau_b^2 = 2$						
NM	0.9520	0.928	0.0037	0.2429	0.1239	0.2499
MI	1.1041	0.946	0.0022	0.2817	0.1600	0.2787
ME	1.0244	0.887	0.0014	0.2613	0.1736	0.3200
SGR	1.0020	0.921	0.0014	0.2556	0.1406	0.2691
SLM	0.9784	0.909	0.0020	0.2496	0.1416	0.2772
CC	1.1650	0.920	0.0027	0.2972	0.1877	0.3067