

**S3 Table. Performance comparison of different methods for additive log normal model.**

Method	$L_1$	ACC	AUPR	$L_1$	ACC	AUPR	$L_1$	ACC	AUPR
Random Graph									
MPLasso	0.052 (0.007)	<b>0.986 (0.005)</b>	<b>0.957 (0.021)</b>	0.033 (0.004)	<b>0.991 (0.002)</b>	<b>0.936 (0.024)</b>	<b>0.028 (0.003)</b>	<b>0.997 (0.001)</b>	<b>0.990 (0.006)</b>
CCLasso	0.053 (0.003)	0.967 (0.009)	0.854 (0.049)	0.044 (0.003)	0.984 (0.003)	0.866 (0.037)	0.035 (0.002)	0.989 (0.003)	0.929 (0.027)
SparCC	0.059 (0.005)	0.962 (0.009)	0.821 (0.048)	0.042 (0.002)	0.983 (0.003)	0.838 (0.036)	0.036 (0.002)	0.988 (0.003)	0.913 (0.030)
REBACCA	<b>0.050 (0.007)</b>	0.968 (0.009)	0.854 (0.047)	<b>0.032 (0.004)</b>	0.986 (0.003)	0.871 (0.035)	0.035 (0.001)	0.991 (0.003)	0.944 (0.027)
SPIEC (mb)	-	0.977 (0.010)	0.847 (0.057)	-	0.989 (0.003)	0.845 (0.035)	-	0.996 (0.003)	0.939 (0.031)
SPIEC (gl)	0.070 (0.011)	0.970 (0.013)	0.834 (0.073)	0.038 (0.005)	0.988 (0.003)	0.864 (0.042)	0.037 (0.004)	0.992 (0.003)	0.917 (0.044)
CCREPE	0.091 (0.008)	0.962 (0.008)	0.811 (0.042)	0.045 (0.003)	0.974 (0.003)	0.718 (0.034)	0.045 (0.002)	0.983 (0.003)	0.848 (0.031)
Hub Graph									
MPLasso	0.083 (0.001)	0.988 (0.003)	0.936 (0.020)	0.047 (0.001)	<b>0.995 (0.001)</b>	0.959 (0.012)	0.044 (0.001)	<b>0.999 (0.001)</b>	<b>0.997 (0.002)</b>
CCLasso	0.076 (0.004)	0.984 (0.005)	0.914 (0.036)	0.057 (0.002)	0.993 (0.001)	0.939 (0.018)	0.042 (0.001)	0.998 (0.001)	0.992 (0.005)
SparCC	0.092 (0.001)	0.973 (0.003)	0.808 (0.034)	0.062 (0.001)	0.989 (0.001)	0.870 (0.021)	0.057 (0.000)	0.995 (0.001)	0.967 (0.010)
REBACCA	<b>0.061 (0.004)</b>	<b>0.989 (0.004)</b>	<b>0.946 (0.033)</b>	<b>0.030 (0.002)</b>	<b>0.995 (0.001)</b>	<b>0.966 (0.015)</b>	<b>0.017 (0.002)</b>	<b>0.999 (0.001)</b>	<b>0.997 (0.002)</b>
SPIEC (mb)	-	0.973 (0.006)	0.757 (0.048)	-	0.990 (0.002)	0.780 (0.050)	-	0.996 (0.001)	0.913 (0.033)
SPIEC (gl)	0.088 (0.000)	0.972 (0.006)	0.768 (0.053)	0.052 (0.000)	0.989 (0.002)	0.825 (0.032)	0.052 (0.000)	0.995 (0.002)	0.919 (0.031)
CCREPE	0.100 (0.004)	0.965 (0.003)	0.741 (0.038)	0.060 (0.002)	0.981 (0.000)	0.655 (0.033)	0.064 (0.002)	0.983 (0.001)	0.777 (0.032)
Cluster Graph									
MPLasso	0.042 (0.003)	<b>0.946 (0.009)</b>	<b>0.841 (0.027)</b>	0.024 (0.002)	<b>0.969 (0.003)</b>	<b>0.798 (0.021)</b>	0.020 (0.001)	<b>0.979 (0.003)</b>	<b>0.895 (0.020)</b>
CCLasso	0.052 (0.002)	0.911 (0.010)	0.680 (0.029)	0.043 (0.002)	0.955 (0.004)	0.662 (0.030)	0.033 (0.001)	0.958 (0.004)	0.717 (0.024)
SparCC	0.061 (0.003)	0.906 (0.010)	0.650 (0.024)	0.043 (0.002)	0.953 (0.003)	0.632 (0.024)	0.037 (0.002)	0.956 (0.004)	0.690 (0.022)
REBACCA	<b>0.031 (0.002)</b>	0.911 (0.010)	0.679 (0.028)	<b>0.018 (0.001)</b>	0.956 (0.004)	0.667 (0.025)	<b>0.014 (0.001)</b>	0.958 (0.004)	0.718 (0.022)
SPIEC (mb)	-	0.910 (0.013)	0.647 (0.035)	-	0.960 (0.006)	0.655 (0.030)	-	0.967 (0.006)	0.717 (0.035)
SPIEC (gl)	0.061 (0.005)	0.908 (0.012)	0.658 (0.030)	0.029 (0.003)	0.956 (0.005)	0.661 (0.035)	0.029 (0.003)	0.961 (0.005)	0.711 (0.041)
CCREPE	0.124 (0.009)	0.907 (0.009)	0.651 (0.022)	0.060 (0.005)	0.945 (0.003)	0.558 (0.023)	0.060 (0.005)	0.952 (0.004)	0.644 (0.021)
Band(4) Graph									
MPLasso	0.065 (0.006)	<b>0.910 (0.005)</b>	<b>0.765 (0.015)</b>	0.041 (0.001)	<b>0.950 (0.002)</b>	<b>0.720 (0.013)</b>	0.033 (0.001)	0.959 (0.002)	0.780 (0.010)
CCLasso	0.056 (0.002)	0.876 (0.005)	0.625 (0.015)	0.049 (0.002)	0.937 (0.002)	0.606 (0.010)	0.037 (0.001)	<b>0.944 (0.001)</b>	<b>0.669 (0.007)</b>
SparCC	0.070 (0.002)	0.869 (0.004)	0.595 (0.016)	0.049 (0.001)	0.935 (0.002)	0.578 (0.011)	0.043 (0.001)	0.941 (0.002)	0.645 (0.010)
REBACCA	<b>0.063 (0.002)</b>	0.880 (0.005)	0.644 (0.017)	<b>0.034 (0.001)</b>	0.939 (0.002)	0.629 (0.012)	<b>0.027 (0.001)</b>	0.945 (0.002)	0.686 (0.009)
SPIEC (mb)	-	0.862 (0.011)	0.650 (0.020)	-	0.940 (0.005)	0.630 (0.017)	-	0.945 (0.007)	0.682 (0.021)
SPIEC (gl)	0.096 (0.000)	0.855 (0.010)	0.644 (0.015)	0.050 (0.000)	0.933 (0.003)	0.629 (0.014)	0.050 (0.000)	0.939 (0.003)	0.669 (0.015)
CCREPE	0.175 (0.002)	0.871 (0.005)	0.593 (0.016)	0.090 (0.001)	0.924 (0.002)	0.495 (0.012)	0.091 (0.001)	0.935 (0.002)	0.582 (0.013)
Scale-free Graph									
MPLasso	0.057 (0.008)	<b>0.986 (0.004)</b>	<b>0.919 (0.035)</b>	0.031 (0.004)	<b>0.989 (0.002)</b>	<b>0.841 (0.035)</b>	0.028 (0.004)	<b>0.993 (0.002)</b>	<b>0.916 (0.037)</b>
CCLasso	0.057 (0.007)	0.976 (0.004)	0.836 (0.048)	0.042 (0.003)	0.986 (0.001)	0.755 (0.041)	0.034 (0.003)	0.987 (0.002)	0.815 (0.057)
SparCC	0.058 (0.005)	0.974 (0.004)	0.807 (0.044)	0.040 (0.003)	0.985 (0.001)	0.724 (0.047)	0.034 (0.003)	0.987 (0.001)	0.801 (0.044)
REBACCA	<b>0.054 (0.009)</b>	0.976 (0.004)	0.826 (0.050)	<b>0.030 (0.005)</b>	0.986 (0.001)	0.754 (0.044)	<b>0.025 (0.005)</b>	0.986 (0.002)	0.778 (0.064)
SPIEC (mb)	-	0.981 (0.006)	0.818 (0.053)	-	0.987 (0.002)	0.740 (0.056)	-	0.990 (0.003)	0.818 (0.046)
SPIEC (gl)	0.068 (0.008)	0.977 (0.005)	0.821 (0.049)	0.033 (0.004)	0.986 (0.002)	0.782 (0.035)	0.033 (0.005)	0.988 (0.002)	0.816 (0.035)
CCREPE	0.072 (0.004)	0.970 (0.003)	0.794 (0.039)	0.034 (0.001)	0.980 (0.000)	0.628 (0.036)	0.035 (0.001)	0.983 (0.001)	0.740 (0.045)

We consider five different graph structures and three sets of parameters, namely,  $(p = 50, n = 200)$ ,  $(p = 100, n = 200)$ , and  $(p=100, n=400)$ . For each experiment, we average over 100 simulation runs with standard deviations in round brackets. Bold number shows best result.