The effect of intra- and interspecific competition on coexistence in multispecies communities

Supplementary Figures

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The figures below (Figures S1–S20) show that the results reported in the main text are robust across various parameterizations. The first three of each parameterization read exactly like Figures 1–3 in the main text, except for the set of intra- and interspecific coefficients, which we report in the figure captions. The additional two figures of each parameterization show the relationship of the leading eigenvalue of the most/least stabilized configuration of coefficients with respect to a distribution generated by randomly assorting those coefficients.

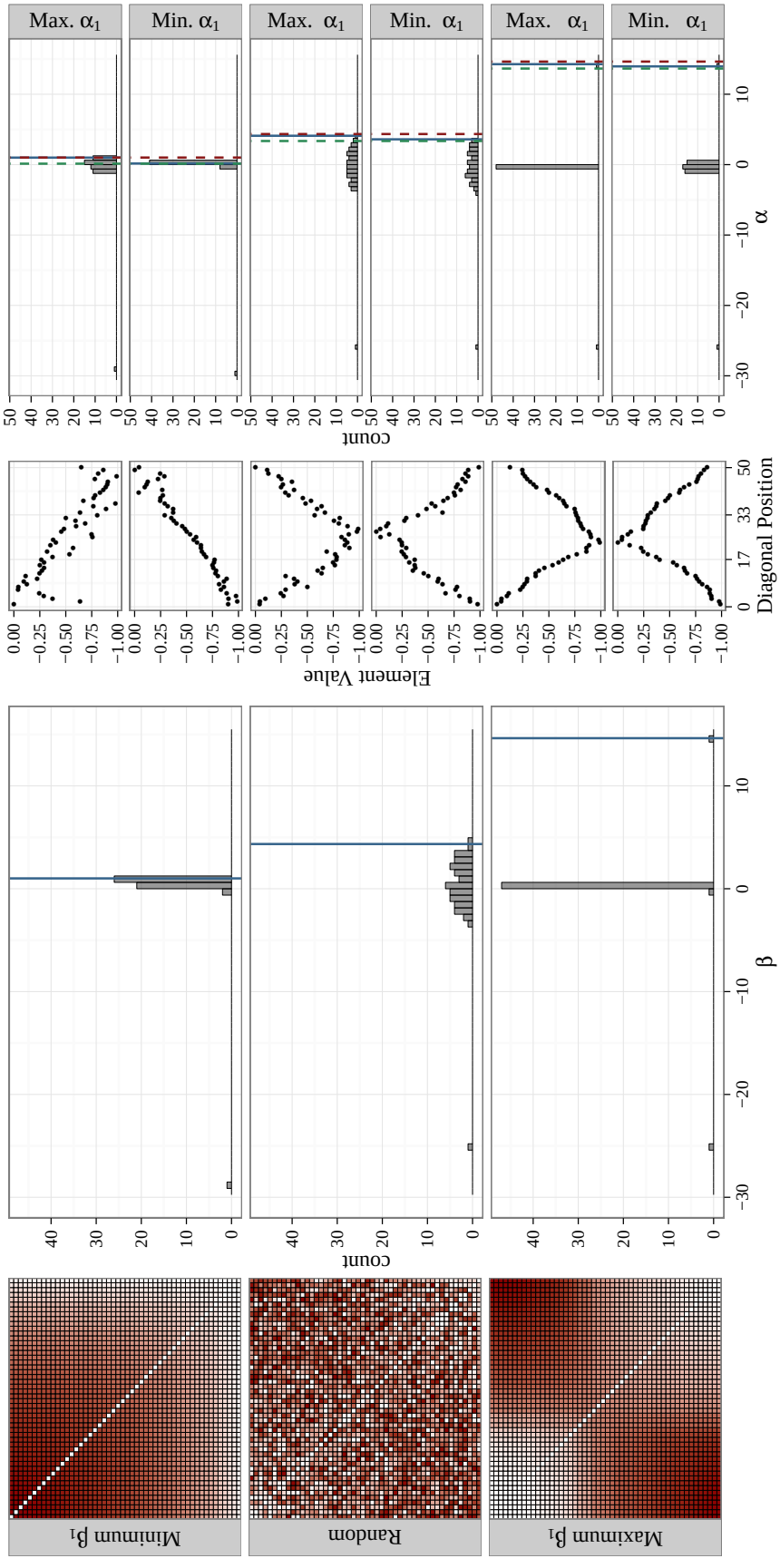

Figure S1: As Figure 1 in the main text, except the interspecific competition coefficients are uniformly sampled from $[-1, 0]$, and the intraspecific coefficients are also uniformly sampled from $[-1, 0]$.

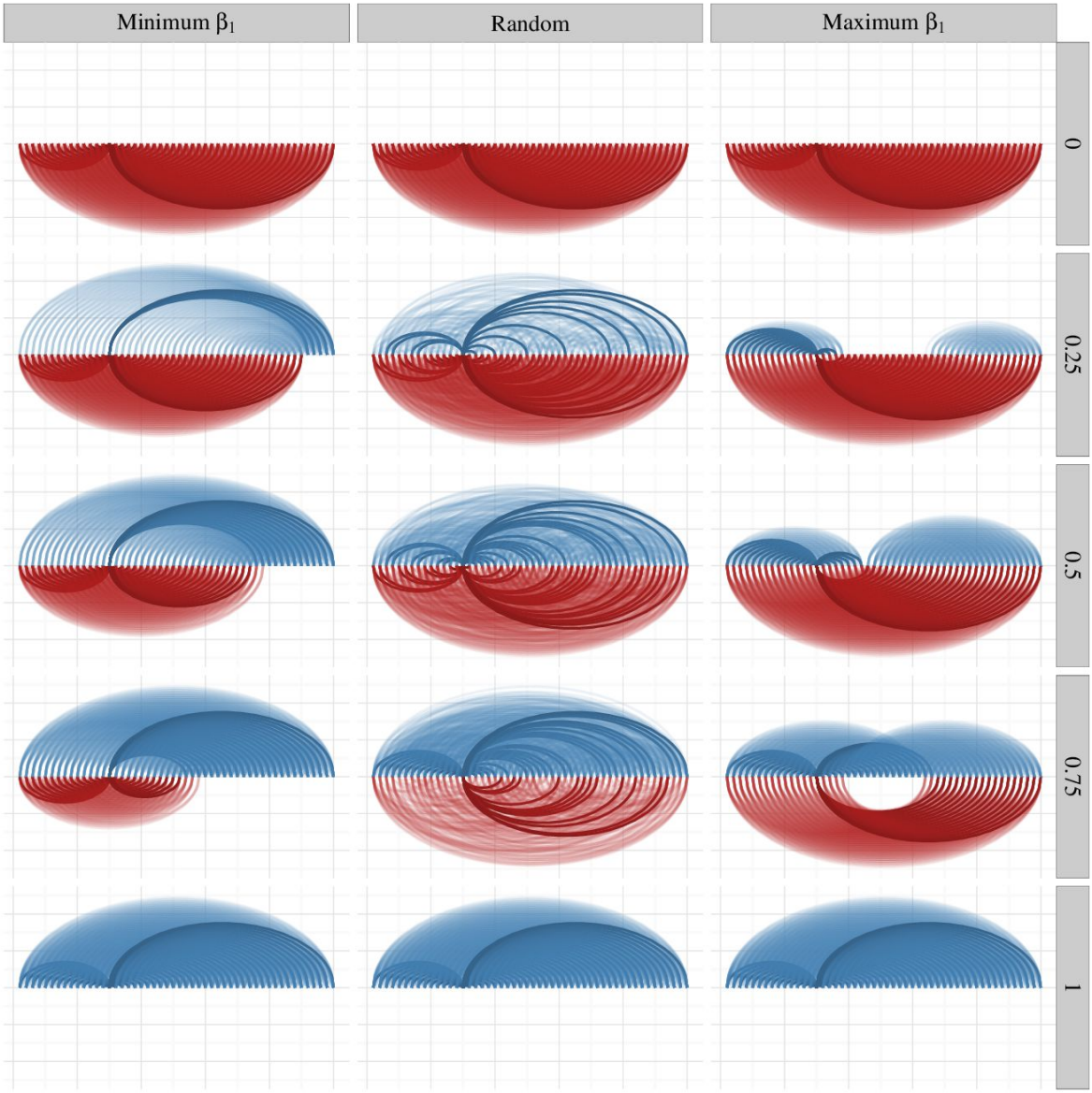

Figure S2: As Figure 2 in the main text, except with the three interspecific interaction matrices in Figure S1.

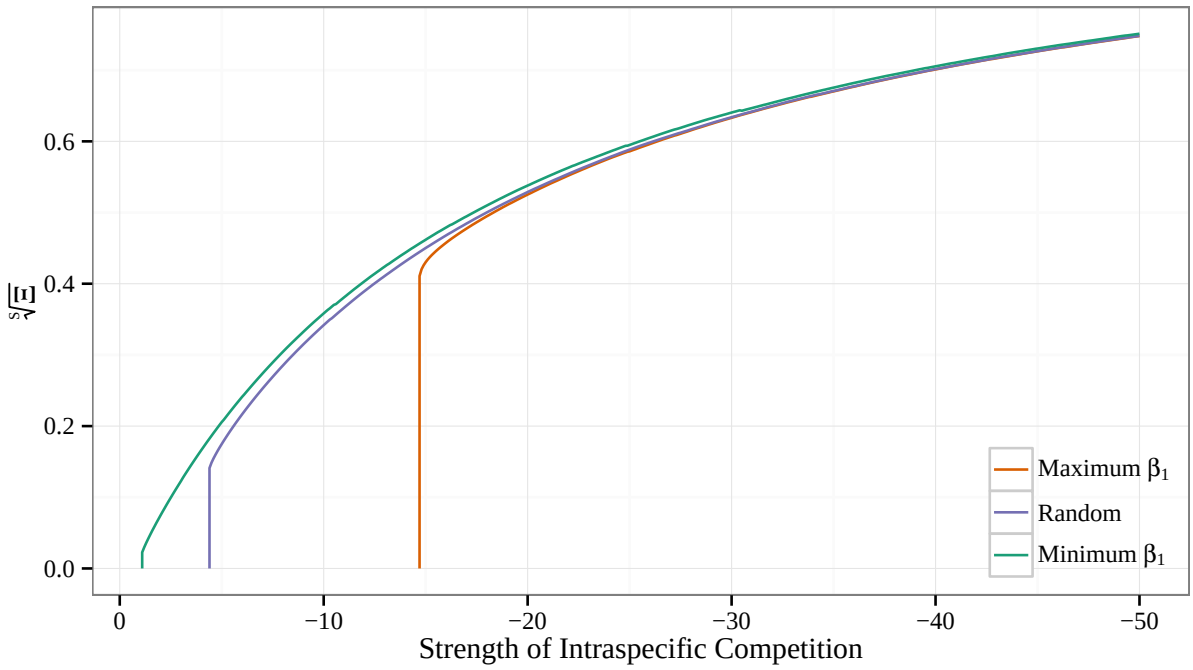

Figure S3: As Figure 3 in the main text, except the interspecific competition coefficients are uniformly sampled from $[-1, 0]$.

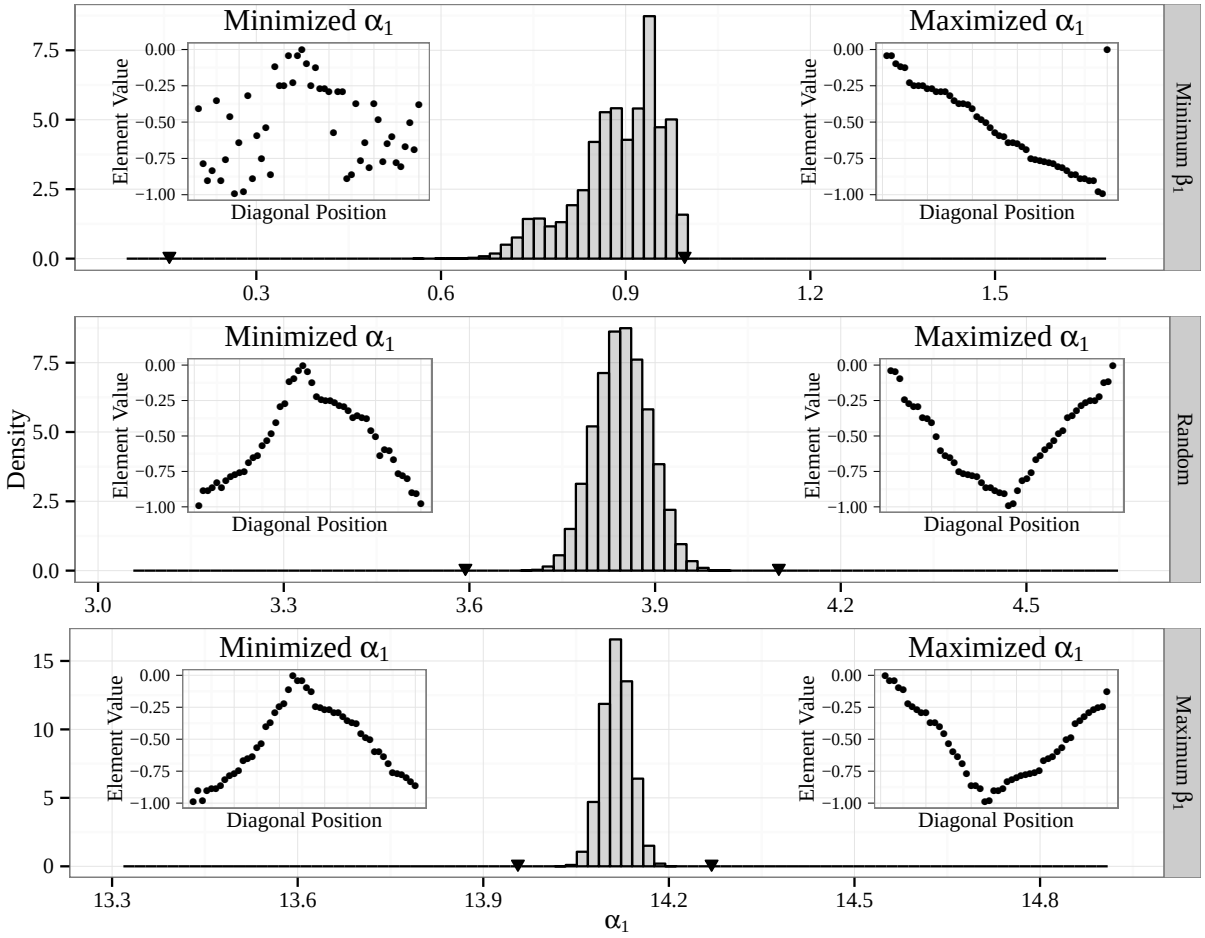

Figure S4: Distributions of the rightmost eigenvalue α_1 of $\mathbf{A} = \mathbf{B} + \mathbf{C}$ ($\mathbf{B}$ contains only interspecific, $\mathbf{C}$ only intraspecific effects) in a 50-species community, when the rightmost eigenvalue β_1 of $\mathbf{B}$ is minimized (top), corresponds to a random matrix (middle), or maximized (bottom). The histogram in each row is generated by $100,000$ random permutations of $\mathbf{C}$'s diagonal coefficients. Species in the insets are ordered as in Figure S1. In each of the three cases, we also looked for the particular arrangement which minimizes/maximizes α_1, using a genetic optimization algorithm (left/right insets showing the magnitudes of $\mathbf{C}$'s diagonal entries in order; their corresponding values of α_1 are marked by the arrows). Interspecific competition coefficients are uniformly sampled from $[-1, 0]$, and the intraspecific coefficients are also uniformly sampled from $[-1, 0]$.

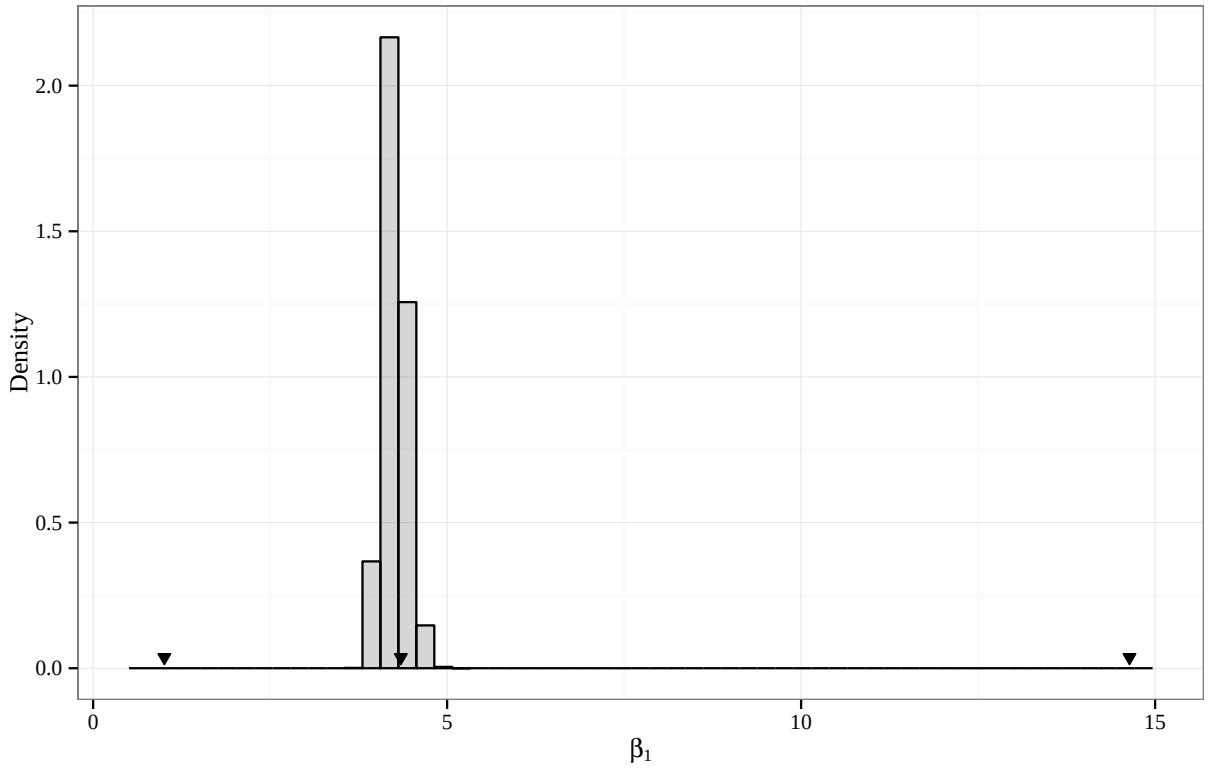

Figure S5: Distributions of the rightmost eigenvalue β_1 of **B** in a 50-species community. The histogram is generated by 100,000 random permutations of **B**'s coefficients. The black arrows indicate the rightmost eigenvalues of the most stabilized, random, and least stabilized configurations, respectively (as in Figure S1). The first and last of which were found using a genetic optimization algorithm. The most stabilized matrix has been sorted according to the eigenvector associated with the left-most eigenvalue; the other two are sorted by the eigenvector associated with the right-most eigenvalue. Interspecific competition coefficients are uniformly sampled from $[-1, 0]$.

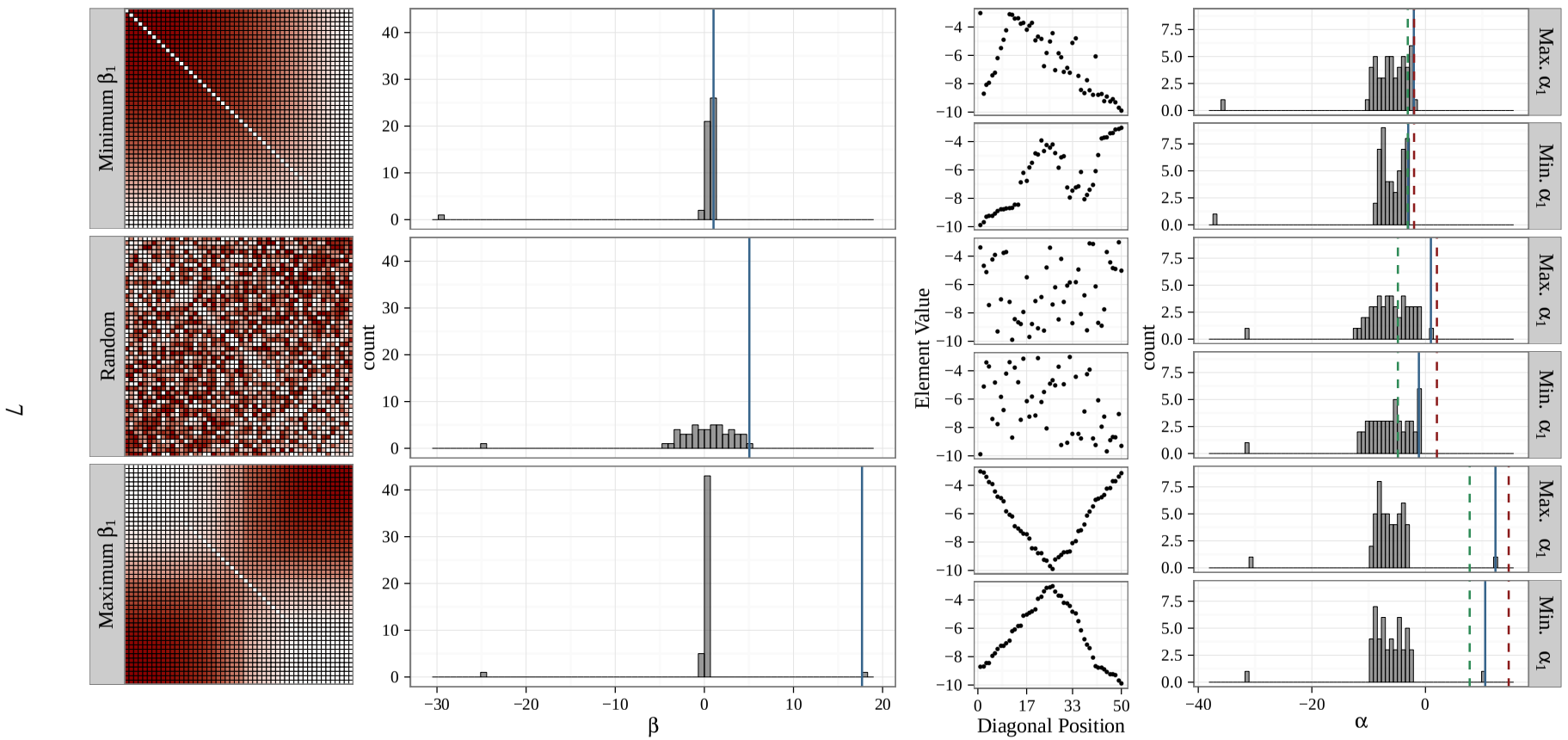

Figure S6: As Figure 1 in the main text, except the interspecific competition coefficients are sampled from a beta distribution with parameters $(1/2,\ 1/2)$, and the intraspecific coefficients are uniformly sampled from $[-10, -3]$.

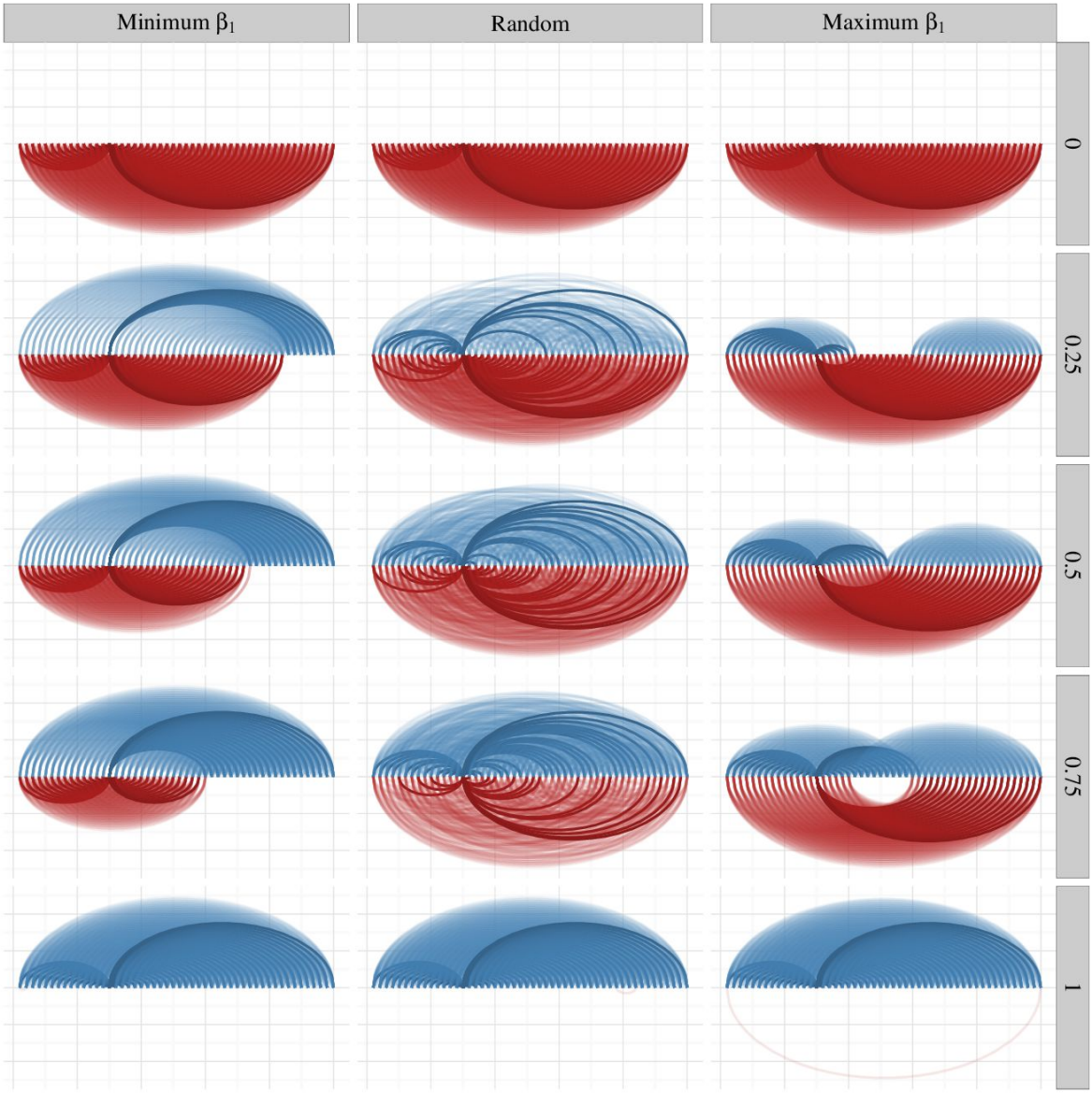

Figure S7: As Figure 2 in the main text, except with the three interspecific interaction matrices in Figure S6.

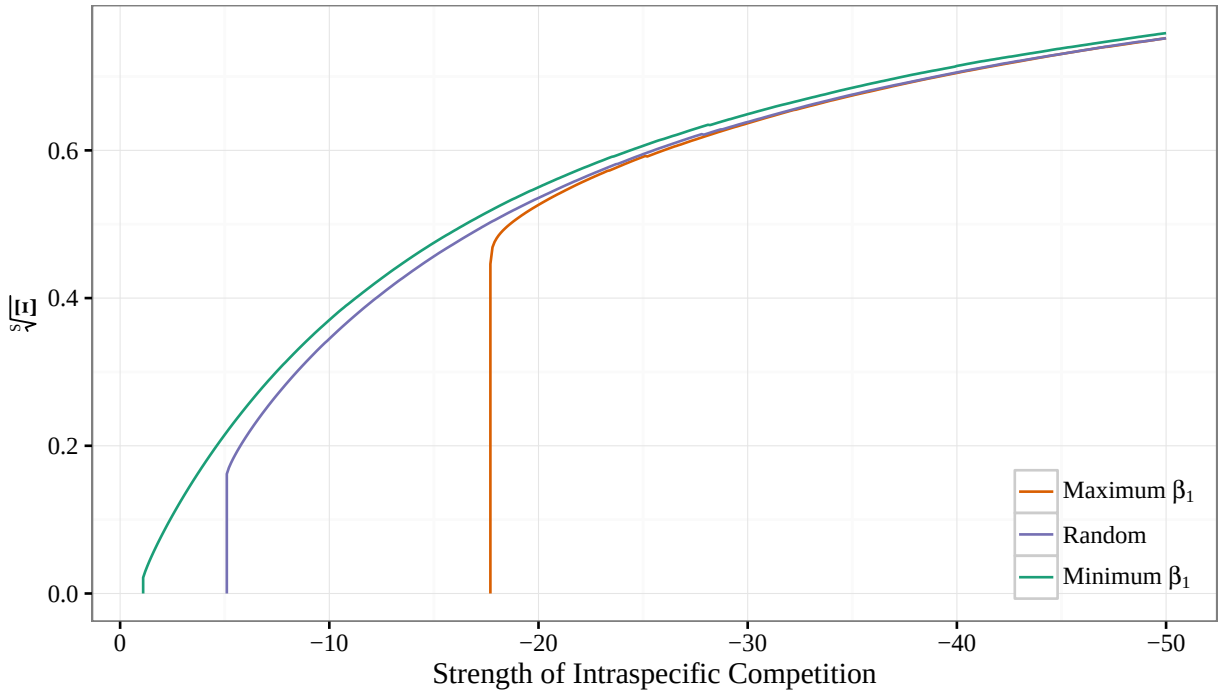

Figure S8: As Figure 3 in the main text, except the interspecific competition coefficients are sampled from a beta distribution with parameters $(1/2,\ 1/2)$.

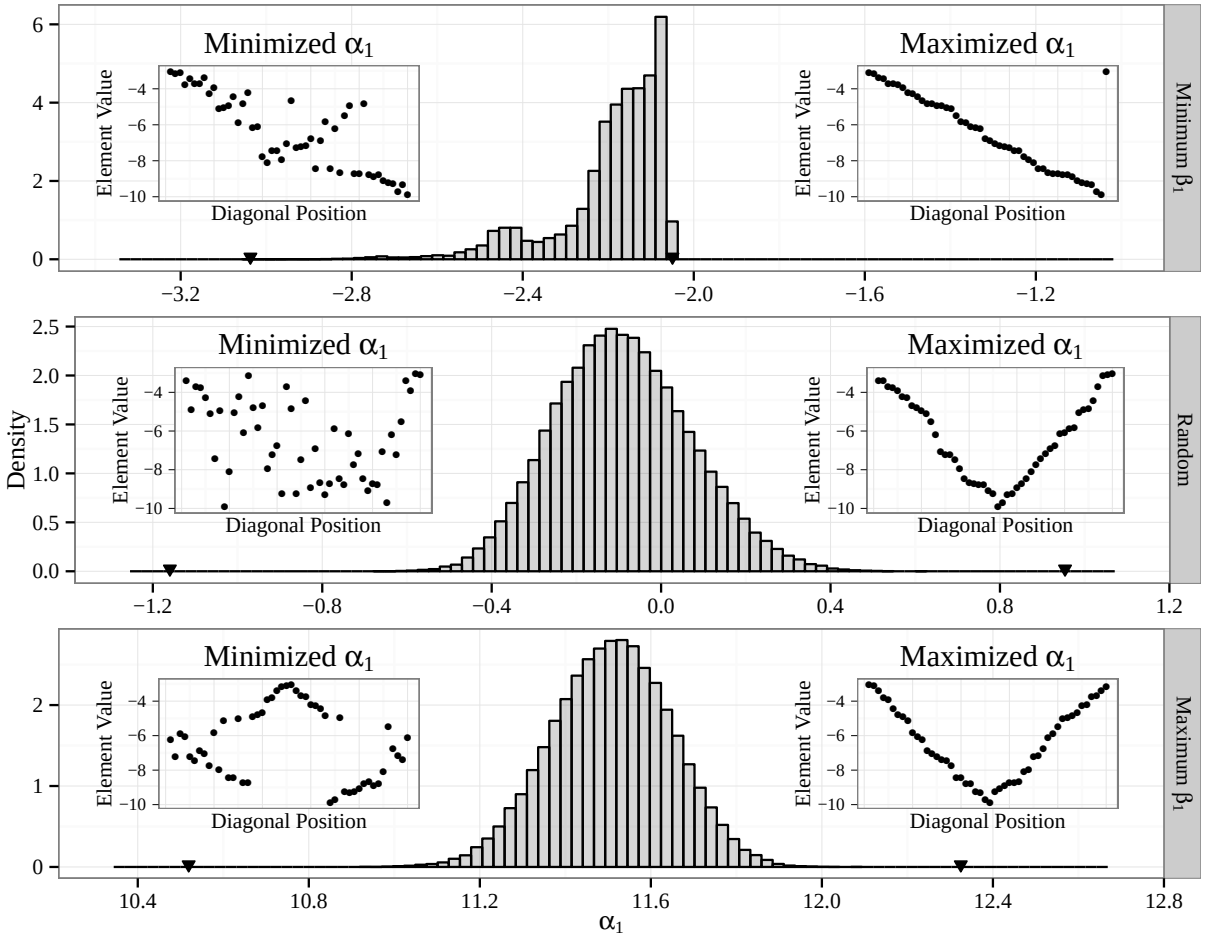

Figure S9: As Figure S4, except with interspecific competition coefficients are uniformly sampled from $[-1, 0]$, and the intraspecific coefficients are also uniformly sampled from $[-1, 0]$.

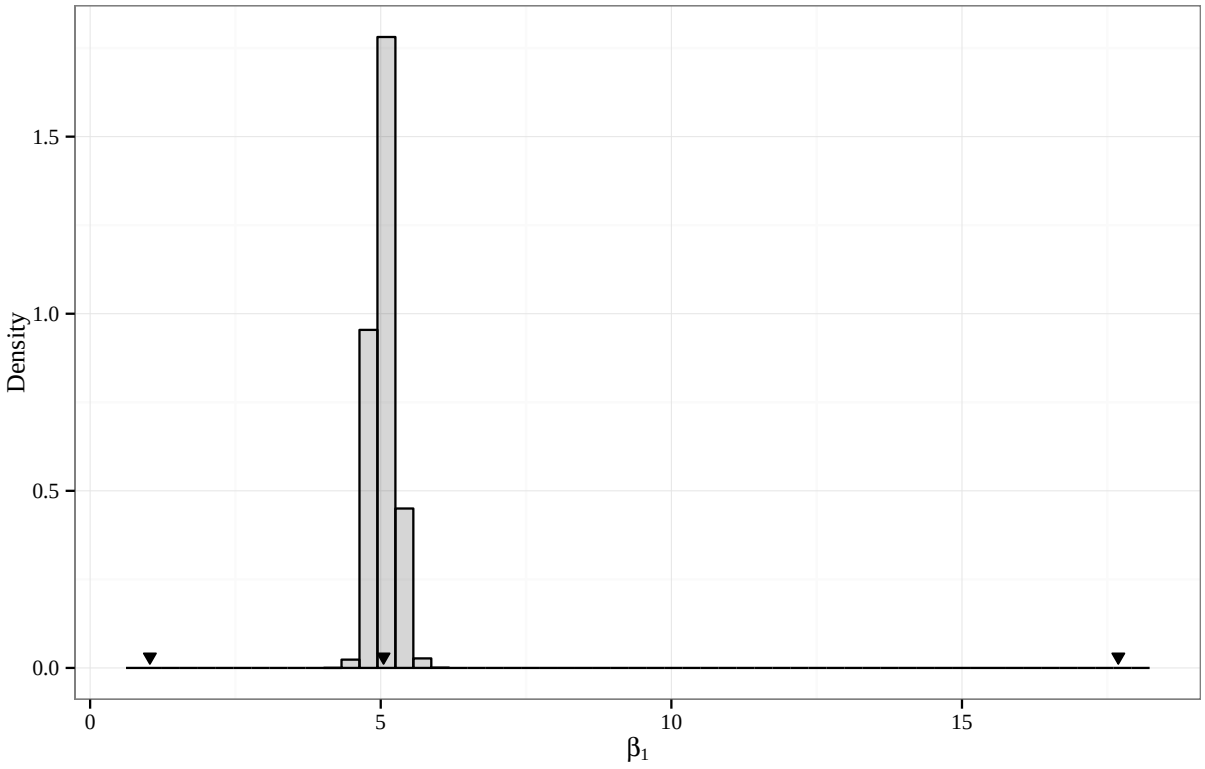

Figure S10: As Figure S5, except with interspecific competition coefficients are uniformly sampled from $[-1, 0]$.

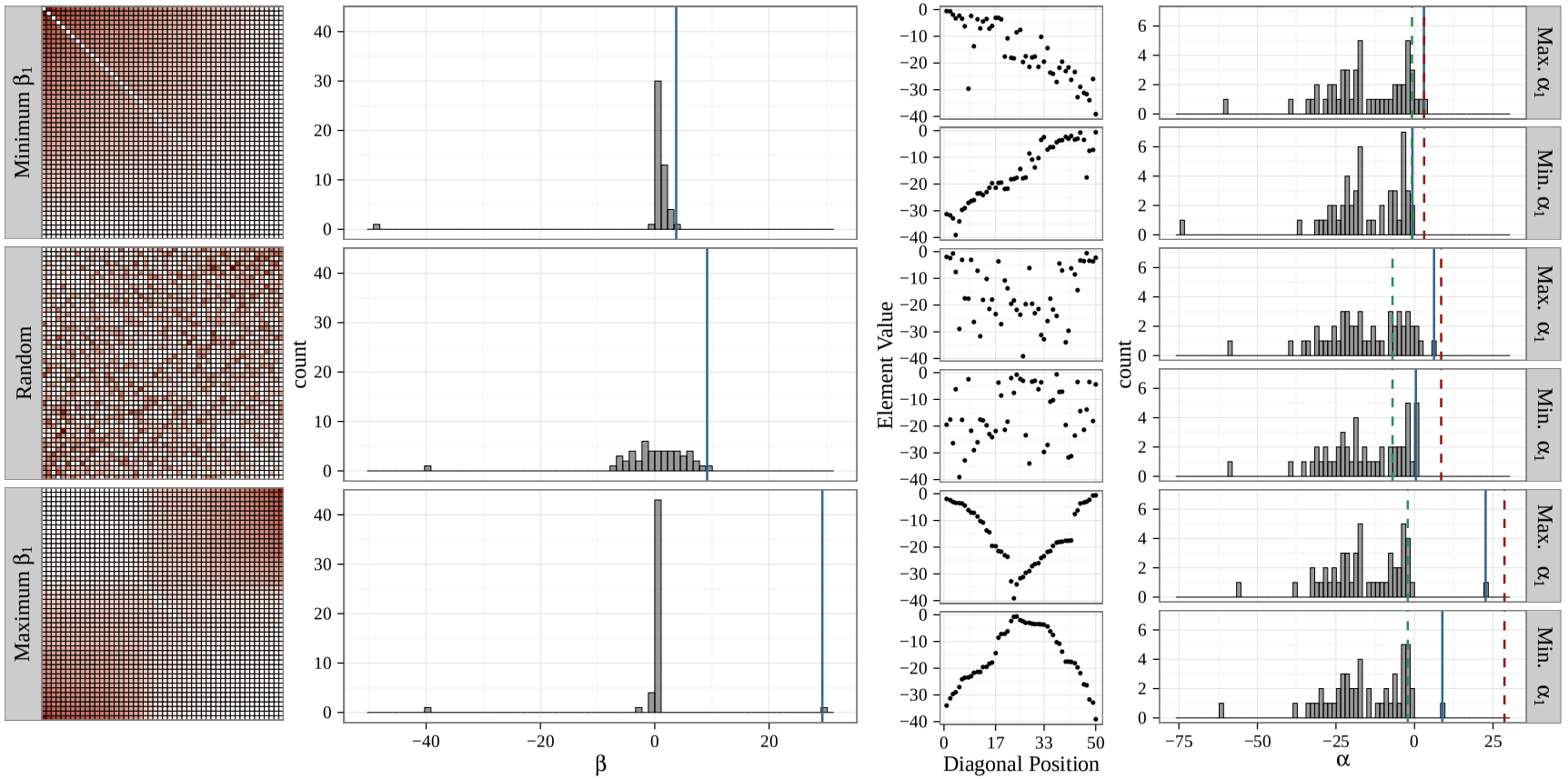

Figure S11: As Figure 1 in the main text, except the interspecific competition coefficients are sampled from a half-normal distribution with $\sigma = 1$, and the intraspecific coefficients are sampled from a half-normal distribution with $\sigma = 20$.

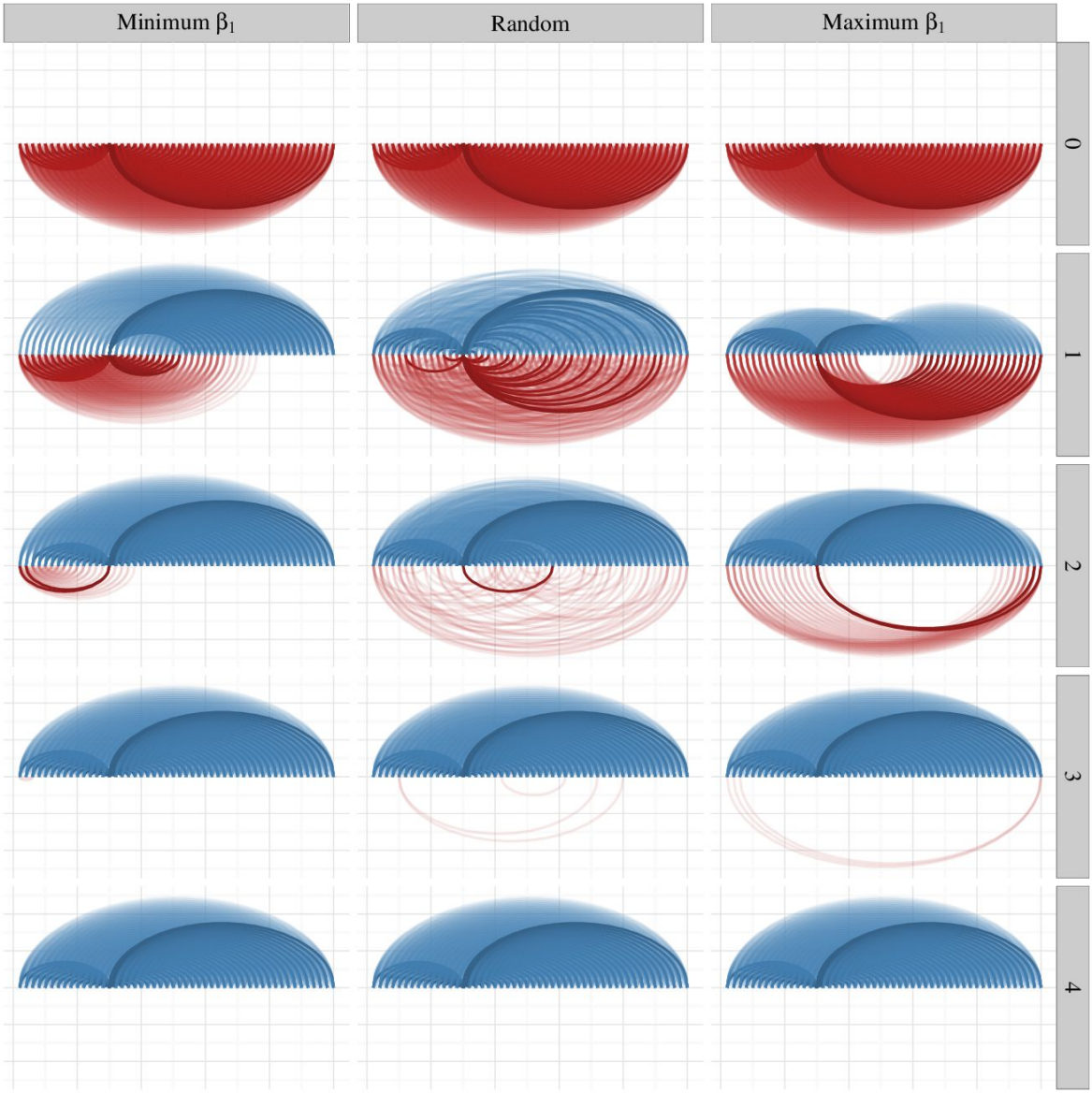

Figure S12: As Figure 2 in the main text, except with the three interspecific interaction matrices in Figure S11.

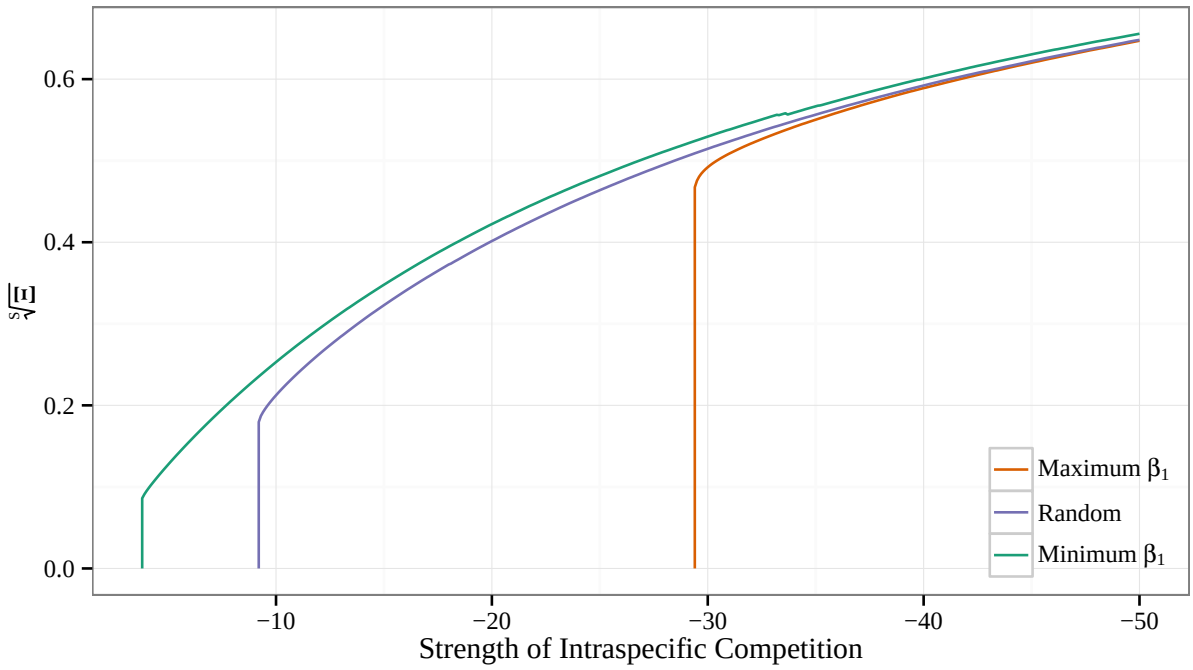

Figure S13: As Figure 3 in the main text, except the interspecific competition coefficients are sampled from a half-normal distribution with $\sigma = 1$.

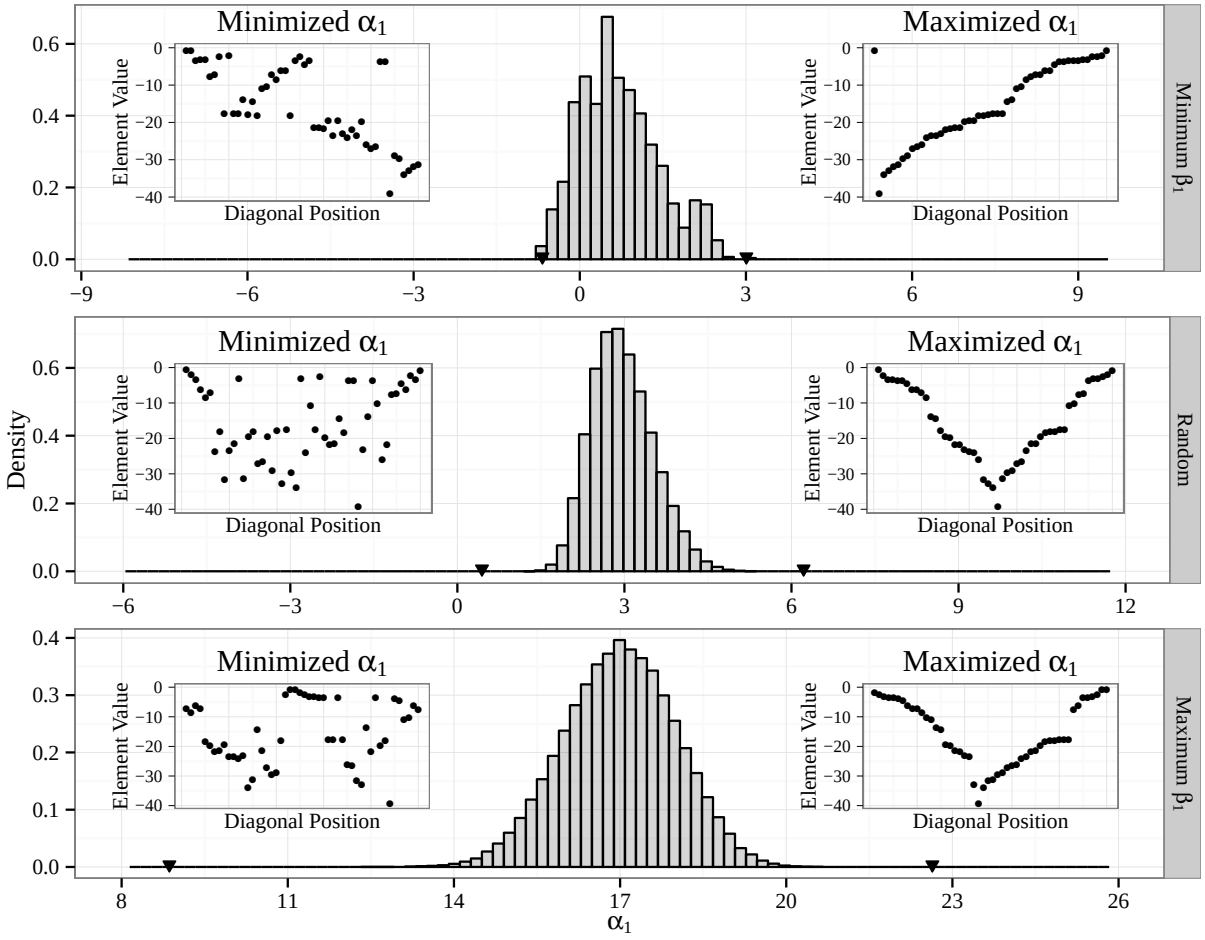

Figure S14: As Figure S4, except with interspecific competition coefficients are uniformly sampled from $[-1, 0]$, and the intraspecific coefficients are also uniformly sampled from $[-1, 0]$.

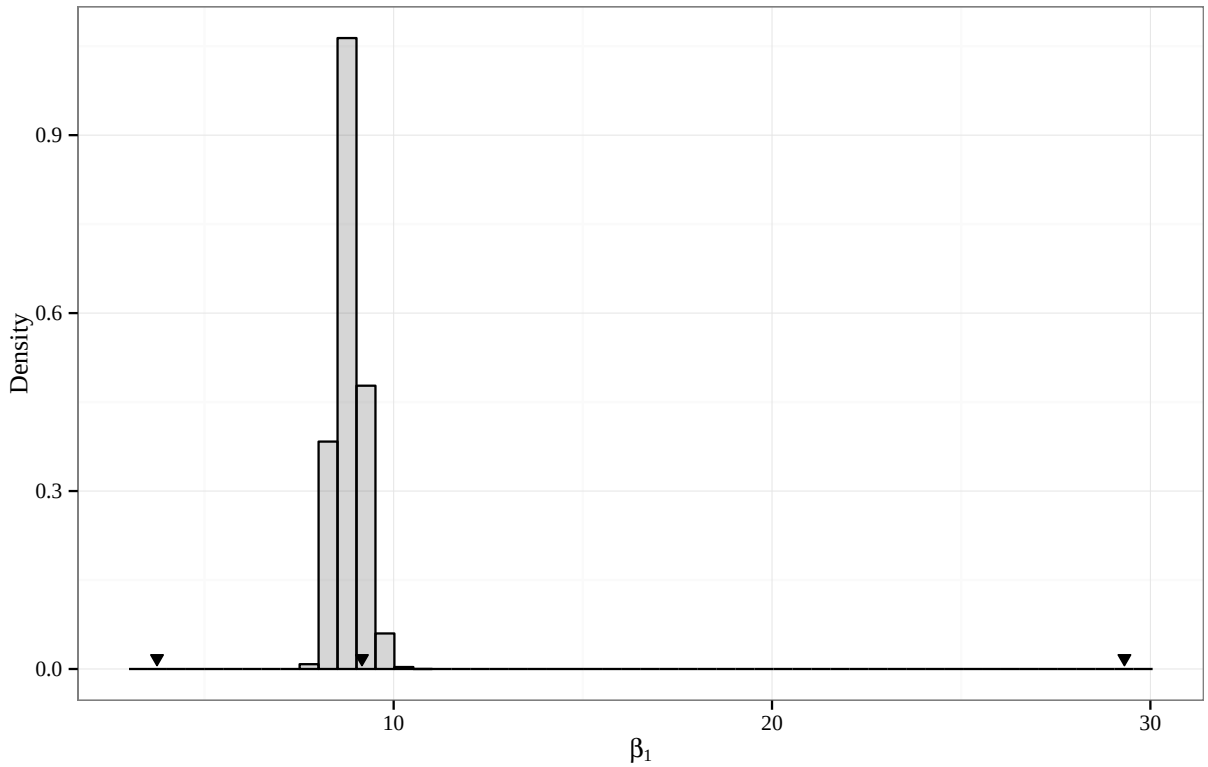

Figure S15: As Figure S5, except the interspecific competition coefficients are sampled from a half-normal distribution with $\sigma = 1$, and the intraspecific coefficients are sampled from a half-normal distribution with $\sigma = 20$.

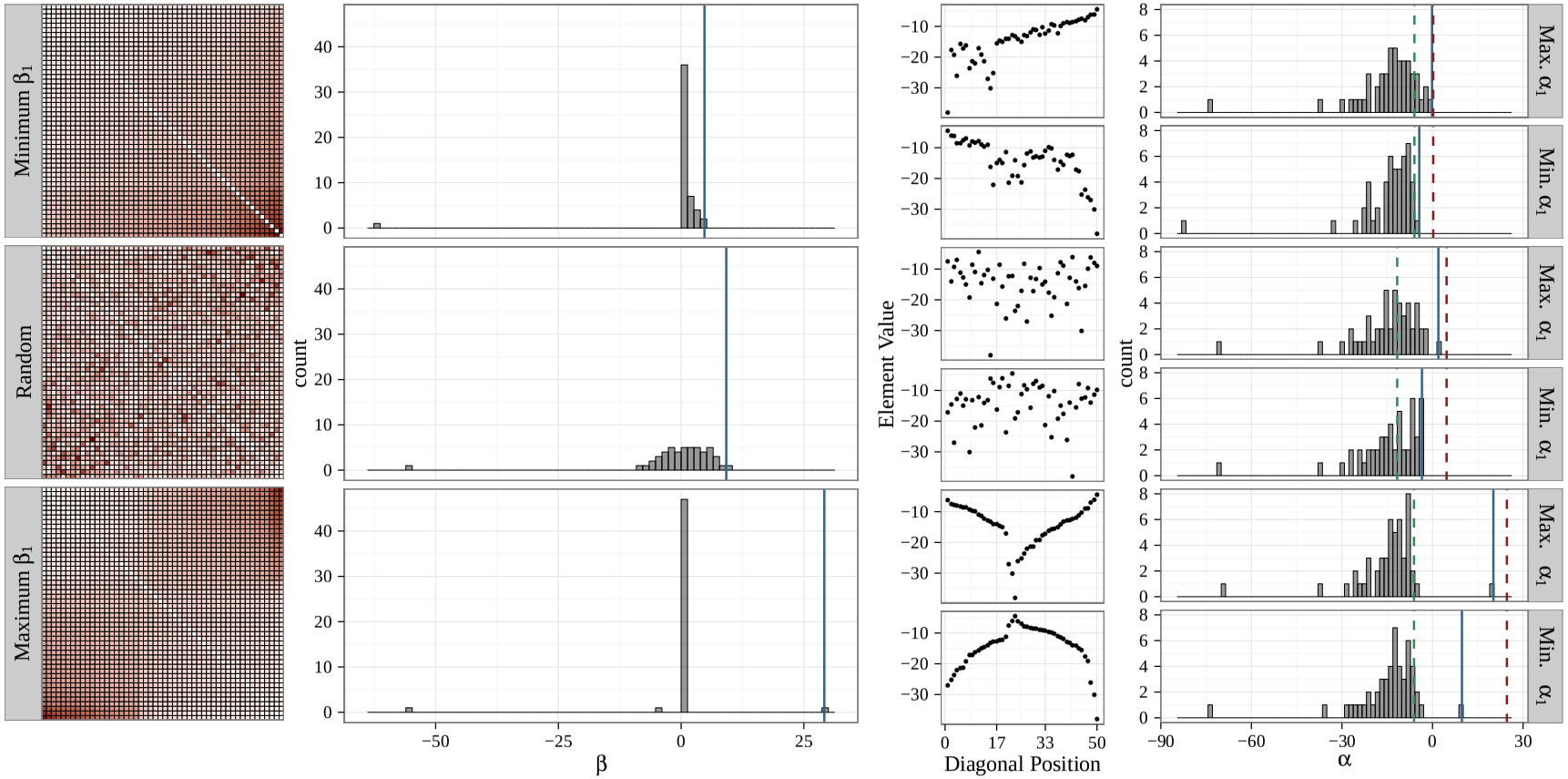

Figure S16: As Figure 1 in the main text, except the interspecific competition coefficients are sampled from a lognormal distribution with parameters $\mu = 0$, $\sigma = 0.5$, and the intraspecific coefficients are sampled from a lognormal distribution with parameters $\mu = 2.5$, $\sigma = 0.5$.

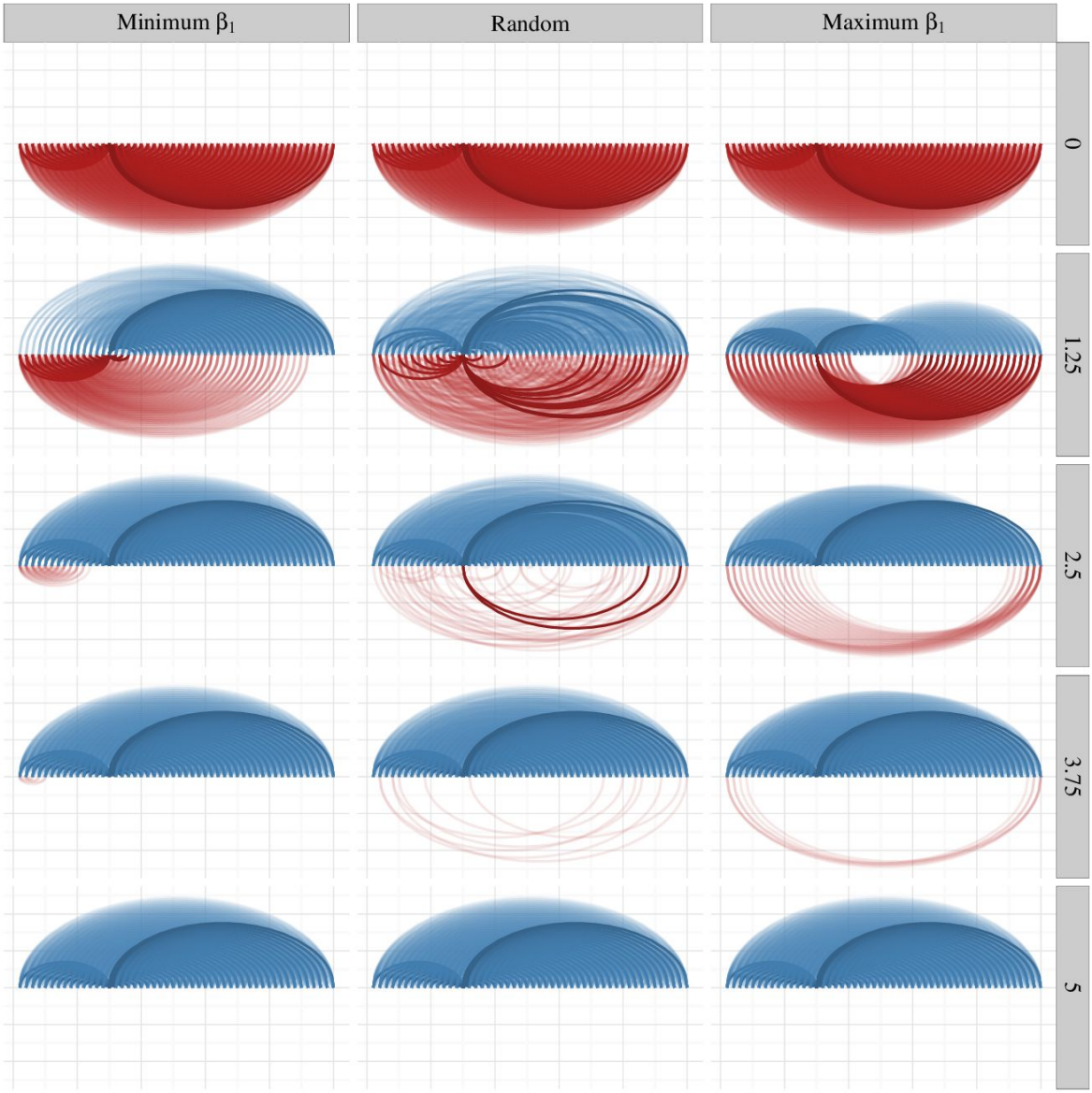

Figure S17: As Figure 2 in the main text, except with the three interspecific interaction matrices in Figure S16.

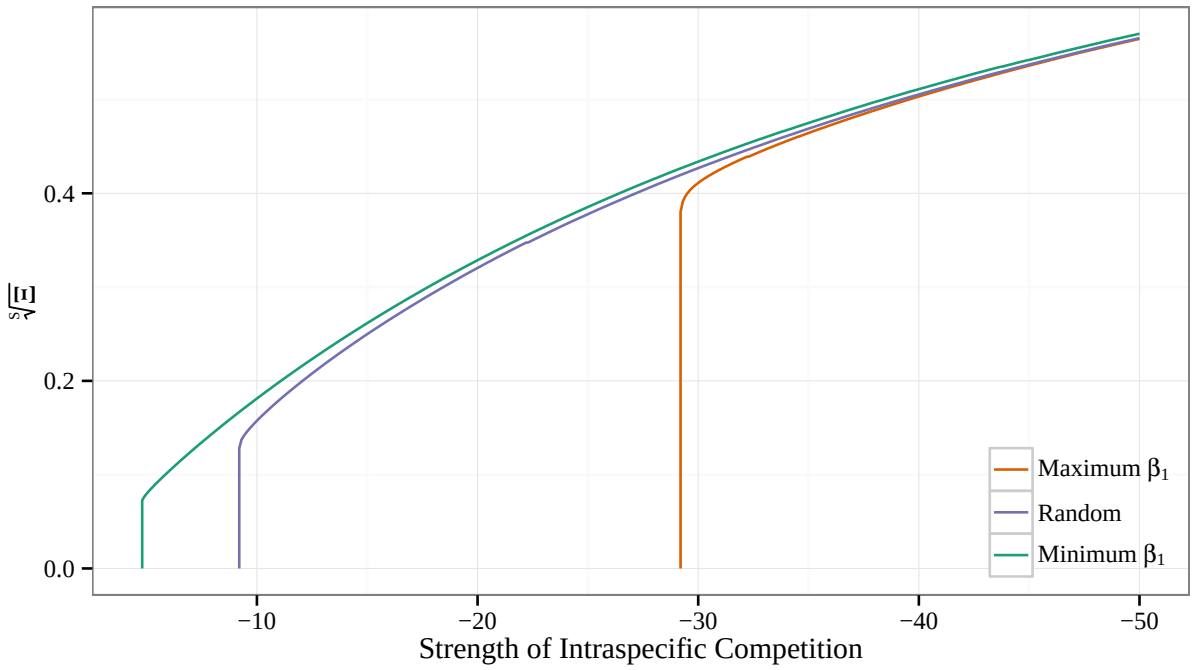

Figure S18: As Figure 3 in the main text, except the interspecific competition coefficients are sampled from a lognormal distribution with parameters $\mu = 0$, $\sigma = 0.5$.

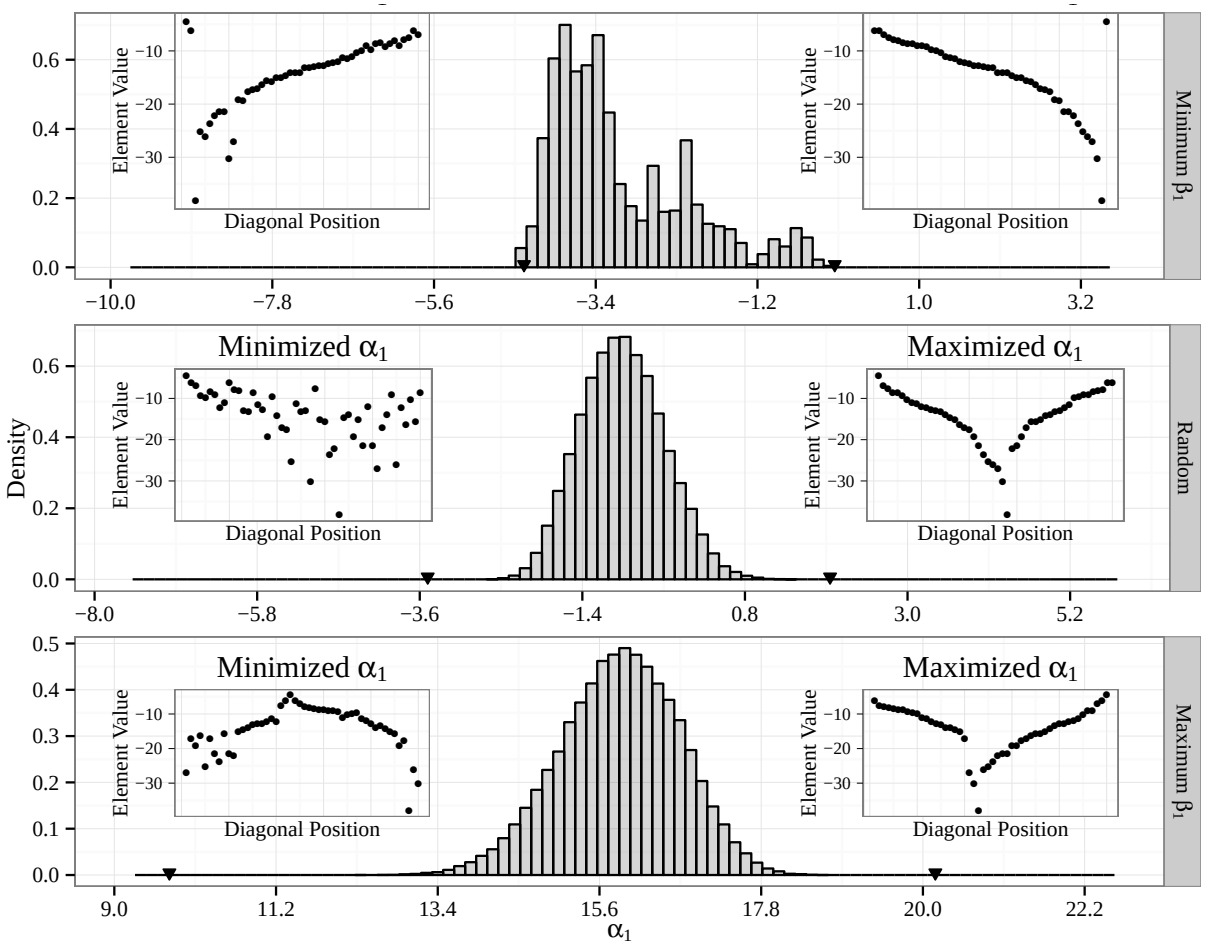

Figure S19: As Figure S4, except the interspecific competition coefficients are sampled from a lognormal distribution with parameters $\mu = 0$, $\sigma = 0.5$, and the intraspecific coefficients are sampled from a lognormal distribution with parameters $\mu = 2.5$, $\sigma = 0.5$.

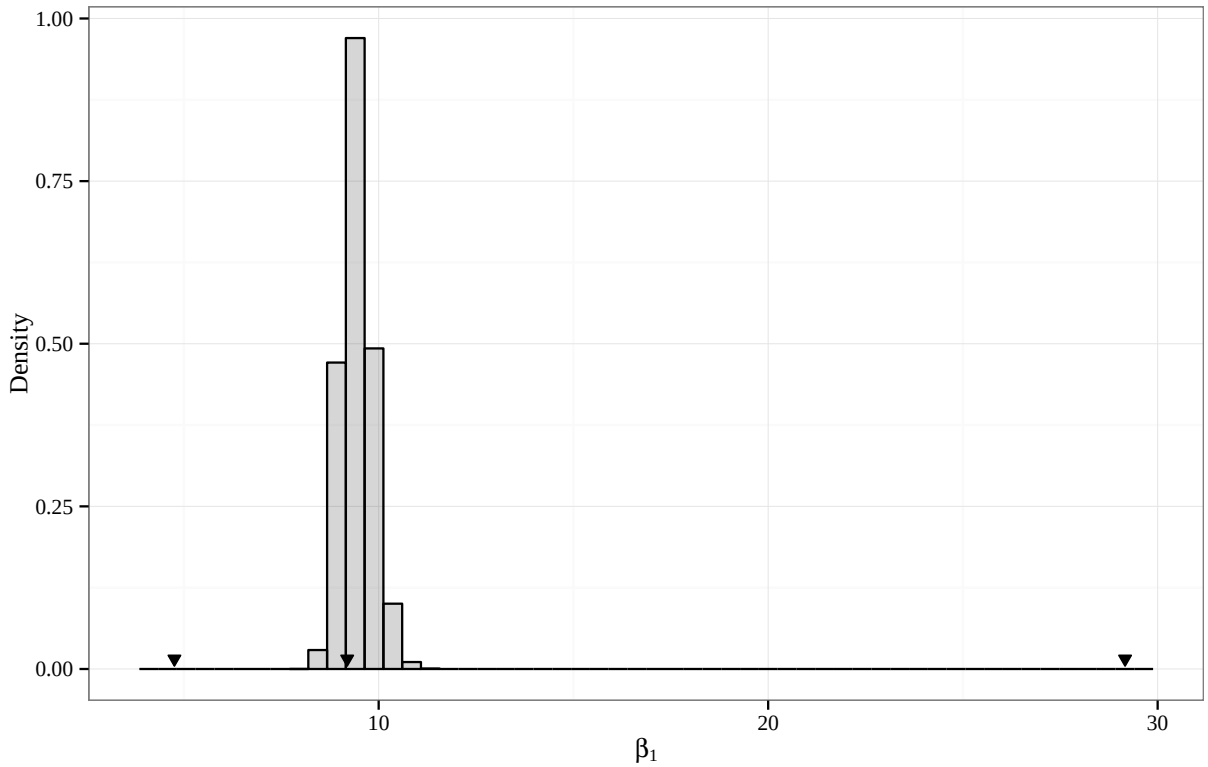

Figure S20: As Figure S5, except the interspecific competition coefficients are sampled from a lognormal distribution with parameters $\mu = 0$, $\sigma = 0.5$.