

## Supplementary file1: Technical details of MCMC computations

Package FME [1] in Statistical Software R [2] was employed to infer posterior predictive parameter distributions. The delayed rejection and Metropolis method [3] as a default computation scheme of FME was applied to perform MCMC computations. MCMC computations for parameter inference were implemented by using the pre-defined function `modMCMC()` in package FME, as introduced in Material and Methods. Convergence of Markov chains to a stationary distribution is required to ensure parameter sets are sampled from a posterior distribution. Only the last 15000 among 50000 chains were used as burn-in. The convergence of last 15000 chains was manually checked with figures produced by package coda [4], a collection of diagnostic tools of MCMC computation. The 95% credible interval drawn as a shadow region in each panel of **Fig. 2** is produced from 100 randomly chosen inferred parameter sets and corresponding model predictions. We employed a bootstrap  $t$ -test [5] to quantitatively characterize the difference of the Malthus coefficient  $M$  and basic reproduction number  $R_0^*$  between SHIV-KS661 and -#64. Total 10000 parameter sets were sampled with replacement from the posterior predictive distributions to calculate the bootstrap  $t$ -statistics for  $M$  and  $R_0^*$ . To avoid potential bias due to sampling, the bootstrap  $t$ -test was performed 100 times repeatedly. The average of the computed  $p$ -values was finally used as an indicator of difference.

### SI References

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