**Transforming to**

The definition of the log-distance ratio of a galaxy is

where represents its observed comoving distance (calculated from the observed redshift) and represents its true distance. Equivalently, we can write this equation as

We can treat as a constant for every galaxy.

Due to Malmquist bias, the probability distribution of the true distance must follow

By transforming the variables, the probability distribution of the log-distance is given by

From (2), we get

By combining (3) and (5), we get

Therefore, the prior of that allows for homogeneous Malmquist bias is

We can also determine the implication of assuming a flat prior in to the assumption of the distribution in . Since we have

Therefore, assuming a flat prior distribution in means