Simulation requires drawing from the error term distribution

Simulation requires drawing from the error term distribution

- Standard normal and uniform: use built-in random number generators

Simulation requires drawing from the error term distribution

- Standard normal and uniform: use built-in random number generators
- Other distributions: various transformation methods (e.g. `-log(-log(rand()))`)

Simulation requires drawing from the error term distribution

- Standard normal and uniform: use built-in random number generators
- Other distributions: various transformation methods (e.g. `-log(-log(rand()))`)
- Multivariate normals: Choleski decomposition

Simulation requires drawing from the error term distribution

- Standard normal and uniform: use built-in random number generators
- Other distributions: various transformation methods (e.g. `-log(-log(rand()))`)
- Multivariate normals: Choleski decomposition
- Complex densities: accept-reject, importance sampling

Independent random draws can be improved upon:

Independent random draws can be improved upon:

- Antithetic draws: create mirror images to induce negative correlation

Independent random draws can be improved upon:

- Antithetic draws: create mirror images to induce negative correlation
- Halton sequences: systematically fill the distribution space "evenly"

Independent random draws can be improved upon:

- Antithetic draws: create mirror images to induce negative correlation
- Halton sequences: systematically fill the distribution space "evenly"
- Both provide better coverage than pure random draws

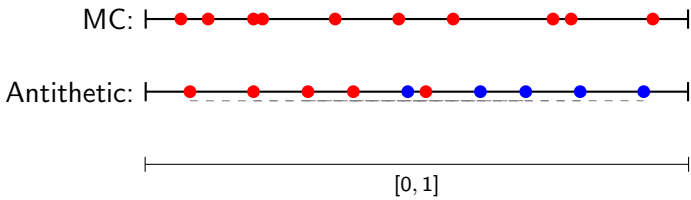
Independent random draws can be improved upon:

- Antithetic draws: create mirror images to induce negative correlation
- Halton sequences: systematically fill the distribution space "evenly"
- Both provide better coverage than pure random draws
- Can substantially reduce simulation error for given R

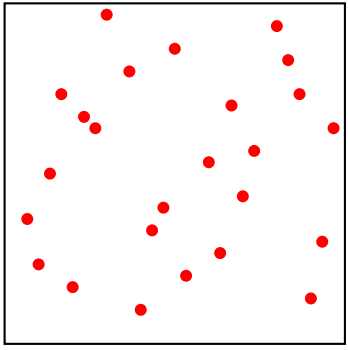
Independent random draws can be improved upon:

- Antithetic draws: create mirror images to induce negative correlation
- Halton sequences: systematically fill the distribution space "evenly"
- Both provide better coverage than pure random draws
- Can substantially reduce simulation error for given R

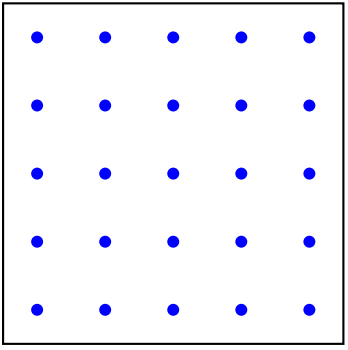
Practical benefit: fewer draws needed for same accuracy


MC:
Antithetic:
[0, 1]

Pure MC (25 draws)



Halton (25 draws)



When implementing simulation-based estimation:

When implementing simulation-based estimation:

- Use same draws across parameter values (prevents chatter)

When implementing simulation-based estimation:

- Use same draws across parameter values (prevents chatter)
- Consider variance reduction techniques for efficiency

When implementing simulation-based estimation:

- Use same draws across parameter values (prevents chatter)
- Consider variance reduction techniques for efficiency
- Increase R with sample size for SML

When implementing simulation-based estimation:

- Use same draws across parameter values (prevents chatter)
- Consider variance reduction techniques for efficiency
- Increase R with sample size for SML
- SMM offers consistency with fixed R at cost of potential efficiency loss

When implementing simulation-based estimation:

- Use same draws across parameter values (prevents chatter)
- Consider variance reduction techniques for efficiency
- Increase R with sample size for SML
- SMM offers consistency with fixed R at cost of potential efficiency loss

Choice depends on computational resources and model complexity