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library(gmwm)

## Loading required package: ggplot2
library(tikzDevice)

# Define sample size
n = 10

# Number of Monte-Carlo replications
B = 5000

# Define grid of values for phi
phi = seq(from = 0.95, to = -0.95, length.out = 30)

# Define result matrix
result = matrix(NA,B,length(phi))

# Start simulation
for (i in seq_along(phi)){
  # Define model
  model = AR1(phi = phi[i], sigma2 = 1)

  # Monte-Carlo
  for (j in seq_len(B)){
    # Simulate AR(1)
    Xt = gen.gts(model, N = n)

    # Estimate Xbar
    result[j,i] = mean(Xt)
  }
}

# Estimate variance of Xbar
var.Xbar = apply(result,2,var)

# Compute theoretical variance
var.theo = (n - 2*phi - n*phi^2 + 2*phi^(n+1))/(n^2*(1-phi^2)*(1-phi)^2)

# Compute (approximate) variance
var.approx = 1/(n*(1-phi)^2)

# Compare variance estimations
tikz("xBar.tex", width = 6, height = 4.5)
plot(NA, xlim = c(-1,1), ylim = range(var.approx), log = "y",
     ylab = "var (\\bar{X})",

```



