approximation

tauchen

Discretizes Gaussian linear AR(1) processes via Tauchen's method

quantecon.markov.approximation.rouwenhorst(*n*, *ybar*, *sigma*, *rho*) [source]

Takes as inputs n, p, q, psi. It will then construct a markov chain that estimates an AR(1) process of: $y_t = \bar{y} + \rho y_{t-1} + \varepsilon_t$ where ε_t is i.i.d. normal of mean 0, std dev of sigma

The Rouwenhorst approximation uses the following recursive defintion for approximating a distribution:

$$\theta_2 = \begin{bmatrix} p & 1-p \\ 1-q & q \end{bmatrix}$$

$$\theta_{n+1} = p \begin{bmatrix} \theta_n & 0 \\ 0 & 0 \end{bmatrix} + (1-p) \begin{bmatrix} 0 & \theta_n \\ 0 & 0 \end{bmatrix} + q \begin{bmatrix} 0 & 0 \\ \theta_n & 0 \end{bmatrix} + (1-q) \begin{bmatrix} 0 & 0 \\ 0 & \theta_n \end{bmatrix}$$

Parameters:

n:int

The number of points to approximate the distribution

ybar:float

The value $\bar{y}$ in the process. Note that the mean of this AR(1) process, y, is simply $\bar{y}/(1-\rho)$

sigma:float

The value of the standard deviation of the ε process

rho:float

By default this will be 0, but if you are approximating an AR(1) process then this is the autocorrelation across periods

Returns:

mc:MarkovChain

An instance of the MarkovChain class that stores the transition matrix and state values returned by the discretization method

quantecon.markov.approximation.std_norm_cdf [source]

quantecon.markov.approximation.tauchen(*rho, sigma_u, b=0.0, m=3, n=7*) [source]

Computes a Markov chain associated with a discretized version of the linear Gaussian AR(1) process

$$y_{t+1} = b + \rho y_t + u_{t+1}$$

using Tauchen's method. Here u_t is an i.i.d. Gaussian process with zero mean.

Parameters:

b:scalar(float)

The constant term of {y_t}

rho:scalar(float)

The autocorrelation coefficient

sigma_u:scalar(float)

The standard deviation of the random process

m:scalar(int), optional(default=3)

The number of standard deviations to approximate out to

n:scalar(int), optional(default=7)

The number of states to use in the approximation

Returns:

mc:MarkovChain

An instance of the MarkovChain class that stores the transition matrix and state values returned by the discretization method