

ECON 4561
Applied Computational Economics
Homework 2
Due Friday, July 3, 2009

1. Write a program that solves numerically the following expression for α :

$$\alpha \int_0^1 \exp(\alpha x - x^2/2) dx = 1.$$

This problem requires you both to integrate and solve a nonlinear equation numerically. You can accomplish this by creating a function file with one line with it, and with calls to the CompEcon Toolbox routines `qnwlege` and `broyden` in the main program.

2. A government stabilizes the supply of a commodity at $S = 2$, but allows the price to be determined by the market. Domestic and export demand for the commodity are given by:

$$\begin{aligned} D &= \tilde{\theta}_1 P^{-0.8} \\ X &= \tilde{\theta}_2 P^{-0.5}, \end{aligned}$$

where $\log \tilde{\theta}_1$ and $\log \tilde{\theta}_2$ are normally distributed with means 0, variances 0.02 and 0.01, respectively, and covariance 0.01.

- (a) Compute the expected price Ep and the ex-ante variance of price Vp using 100 node Gaussian discretization for the demand shocks.
 - (b) Compute the expected price Ep and the ex-ante variance of price Vp using a 1000 replication Monte Carlo integration scheme.
3. Consider a market for an agricultural commodity in which farmers receive a government payment $\bar{p} - p$ per unit of output whenever the market price p drops below an announced target price \bar{p} . In this market, producers base their acreage planting decisions on their expectation of the effective producer price $f = \max(p, \bar{p})$; specifically, acreage planted a is given by:

$$a = 1 + (Ef)^{0.5}.$$

Production q is acreage planted a times a random yield \tilde{y} , unknown at planting time:

$$q = a\tilde{y};$$

and quantity demanded at harvest is given by

$$q = p^{-0.2} + p^{-0.5}.$$

Conditional on information known at planting time, $\log y$ is normally distributed with mean 0 and variance 0.03. For $\bar{p} = 0$, $\bar{p} = 1$, and $\bar{p} = 2$, compute:

- (a) the expected subsidy $E[q(f - p)]$;
- (b) the ex-ante expected producer price Ef ;
- (c) the ex-ante variance of producer price Vf ;
- (d) the ex-ante expected producer revenue Efq ; and
- (e) the ex-ante variance of producer revenue Vfq .