

### Econ 807: Assignment 3

#### Government Spending

1. From Statscan, obtain a series for (real, per capita) government purchases ( $g_t$ ). Assume that  $\ln g_t$  follows a first-order Markov process; i.e.,

$$\ln g_{t+1} = (1 - \rho) \ln \bar{g} + \rho \ln g_t + u_t,$$

where  $u_t \sim N(0, \sigma^2)$ . Note that  $\bar{g}$  represents the average level of (real, per capita) government spending. Estimate the parameters  $\rho, \bar{g}$  and  $\sigma^2$  via an OLS regression. Also, compute the average ( $g_t/y_t$ ) ratio for your sample and label this number  $x$  (you should find  $x \simeq 0.20$ ).

2. Consider a model economy populated by a representative individual with preferences:

$$U(c, l) = \ln(c) + \psi \ln(l).$$

A representative firm utilizes a production technology  $y = An^\theta$ . There is a government that demands output  $g$ . Assume that government expenditures are financed with a lump-sum tax. In the ‘steady-state’ of this economy (i.e., when  $g_t = \bar{g}$ ), the equilibrium level of employment is characterized by the equation:

$$\theta An^{\theta-1} \frac{1}{An^\theta - \bar{g}} = \psi \frac{1}{1-n}.$$

From the definition of  $x$ , we also have:

$$\bar{g} = xAn^\theta.$$

From the data, we already know that  $\theta \simeq 0.70$  and  $n \simeq 1/3$ . Use these two equations to estimate the parameters  $A$  and  $\psi$ .

3. With the model now parameterized, numerically approximate the solution function  $n(g)$ .
4. Using GAUSS’s random number generator, simulate the model and report the behaviour of output (percent standard deviation) and how it is correlated with employment and the real wage. Explain these correlations. According to your estimates, are fiscal spending shocks likely to be a quantitatively important source of the business cycle?