

Macroeconomics Analysis II, EC3102

Tutorial 2 (Asset pricing)¹

Question 1 *Infrequent Stock Transactions and Dividends*

Consider a representative consumer at time t seeking to maximize the sum of discounted lifetime utility from t on,

$$\sum_{s=0}^{\infty} \beta^s u(c_{t+s}),$$

subject to the infinite sequence of flow budget constraints,

$$P_t c_t + S_t a_t = S_t a_{t-2} + D_t a_{t-2} + Y_t,$$

where the notation is as in class: a_t is holdings of a real asset (a "stock") at the end of period t , S_t is its nominal price in t , D_t is the nominal dividend that each unit of assets carried into t (from period $(t - 2)$) pays out, Y_t is nominal income in t , c_t is consumption in t , and P_t is the nominal price of each unit of consumption in t . Note well how the budget constraint is written: it is assets accumulated in period $t - 2$ that pay off in period t ; thus, in this model, stocks (for some reason) must be held for two periods, rather than being able to be traded every period.

a

Construct the Lagrangian to compute the stock price S_t in period t .

b

Solve for the period t stock price using the optimality conditions from the La-grangian constructed.

c

Explain intuitively how and why the stock price differs from that in the model studied in class, in which all shares can be traded every period.

¹Questions adapted from adopted text: Modern Macroeconomics by Sanjay Chugh (2015), Chapter 8, Questions 1 and 8.

Question 2 *Effects of Tax Policy on Stock Prices* .

Consider our infinite-period model with stocks as the only asset. Stocks held at the beginning of period t pay a nominal dividend D_t at the very beginning of period t . Suppose that dividend payments are subject to a proportional tax rate t_t^D in period t , where t_t^D is a number between zero and one. For example, if $t_t^D = 0.20$, then 20 percent of all dividends received by the representative consumer in period t must be paid to the government (we'll disregard here any issues related to what the government does with those revenues).

a.

Set up the period t flow budget constraint, briefly explaining how the dividend tax enters the expression.

b.

Using the flow budget constraint you set up above, show algebraically (i.e., using a Lagrangian) how the nominal stock price in period t , denoted as usual by S_t , depends on the dividend tax when the representative consumer is maximizing lifetime utility from period t onwards. Also, show the dividend tax rate in WHICH period affects the period t stock price? Provide brief economic interpretation or logic.

c.

Suppose in addition to the dividend tax described above, there is also a proportional tax on consumption (a sales tax). The consumption tax rate in period t is t_t^C . Suppose that t_t^C rises, but all other tax rates (including those in the future) remain unchanged. Show algebraically (i.e., using a Lagrangian) how this policy change affects the period t stock price? Also provide brief economic interpretation or logic for your finding.