

Midterm Exam 1

You have 65 minutes to complete this 60 minute exam. Be sure to “box in” your algebraic or numerical answers. Show your work (so that partial credit can be granted if the final answer is incorrect).

1. [10 minutes] Consider the Aggregate Demand-Aggregate Supply framework. Assume oil prices suddenly increase for one period and stay permanently higher. You can assume for simplicity expected inflation is always zero.

1.1 (4 minutes) Show what happens in AD-AS graph in the period the shock occurs.

1.2 (6 minutes) Show what happens over time to output, the price level, and the interest rate.

2. [25 minutes] Suppose the economy is described by the following equations:

Real Sector

- | | | |
|-----|---------------------|---|
| (1) | $Y = Z$ | Output equals aggregate demand, an equilibrium condition |
| (2) | $Z = C + I + G$ | Definition of aggregate demand |
| (3) | $C = c_o + c_1 Y_D$ | Consumption fn, c_1 is the marginal propensity to consume |
| (4) | $Y_D \equiv Y - T$ | Definition of disposable income |
| (5) | $T = t_1 Y$ | Tax function; t_1 is marginal tax rate. |
| (6) | $I = b_0 - b_2 i$ | Investment function |
| (7) | $G = GO_0$ | Government spending on goods and services, exogenous |

And the LM curve is given by:

$$(8) \quad i = \frac{\mu_0}{h} - \left(\frac{1}{h}\right) \left(\frac{M_0}{P_0}\right) + \left(\frac{1}{h}\right) Y$$

2.1 (5 minutes) Solve for the IS curve (Y on the left hand side)

2.2 (5 minutes) Solve for equilibrium income.

2.3 (5 minutes) Show what the multiplier is for a change in government spending on goods and services.

2.4 (5 minutes) Show, either mathematically *or* graphically, what the multiplier is if the Federal Reserve Board targets the interest rate.

3.5 (5 minutes) Suppose money demand depends on wealth, which is the sum of money base and government bonds:

$$(8^*) \quad i = \frac{\mu_0}{h} - \left(\frac{1}{h}\right) \left(\frac{mMB_0}{P_0}\right) + \left(\frac{j}{h}\right) \left(\frac{MB_0 + B_0}{P_0}\right) + \left(\frac{1}{h}\right) Y$$

Assuming the budget is initially in *surplus*, how does the increase in government spending affect output and the interest rate? Show graphically what happens.

3. [15 minutes] Suppose one is examining the term structure of a 3 year discount bond, and the expectations hypothesis of the term structure holds.

$$i_{3t} = \frac{(i_t + i_{t+1}^e + i_{t+2}^e)}{3} \tag{2}$$

Suppose yesterday,

$$i_{3t} = 0.15$$

$$i_t = 0.05$$

3.1 (5 minutes) Calculate the average value of i_{t+1}^e and i_{t+2}^e .

3.2. (5 minutes) Assume the 3 year bond yield is given by:

$$i_{3t} = \frac{(i_t + i_{t+1}^e + i_{t+2}^e)}{3} + rp_{3t} \tag{3}$$

And going from one day to the next day the yield on the 3 year discount bond has increased by Δi_{3t} . Can one say whether the increase is due to change in expected future rates, or due to a change in the risk premium? Why or why not?

3.3 (5 minutes) Draw the yield curve, for 3 months to 30 years (at 3, 6, 12 months, 2, 5, 10, 30 years). Use the following table from 10/19/2018:

Treasury Yields						
NAME	COUPON	PRICE	YIELD	1 MONTH	1 YEAR	TIME (EDT)
GB3:GOV 3 Month	0.00	2.26	2.30%	+14	+120	10/19/2018
GB6:GOV 6 Month	0.00	2.40	2.47%	+10	+121	10/19/2018
GB12:GOV 12 Month	0.00	2.58	2.66%	+10	+125	10/19/2018
GT2:GOV 2 Year	2.75	99.71	2.90%	+10	+133	10/19/2018
GT5:GOV 5 Year	2.88	99.22	3.05%	+10	+103	10/19/2018
GT10:GOV 10 Year	2.88	97.34	3.19%	+13	+81	10/19/2018
GT30:GOV 30 Year	3.00	92.97	3.38%	+18	+48	10/19/2018

4. [10 minutes] Suppose the stock price is given by:

$$P_t = \frac{D_{t+1}}{1 + rp + rf} + \frac{E_t P_{t+1}}{1 + rp + rf} \quad (1)$$

4.1 (4 minutes) Show how to derive the current stock price as a function of stock prices at time $t+3$.

4.2 (6 minutes) Derive the expression for the stock price as a function of only the present discounted value of expected dividends. Explain what assumption(s) you need to make in order to obtain this answer.

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