

Directions:

- The homework will be collected in a box **before** the large lecture.
- Please place your name, TA name, and section number on the top of the homework (legibly). Make sure you write your name as it appears on your ID so that you can receive the correct grade.
- Late homework will not be accepted so make plans ahead of time. **Please show your work.** Good luck!

Please realize that you are essentially creating “your brand” when you submit this homework. Do you want your homework to convey that you are competent, careful, professional? Or, do you want to convey the image that you are careless, sloppy, and less than professional. For the rest of your life you will be creating your brand: please think about what you are saying about yourself when you do any work for someone else!

1) Aggregate Consumption and Expenditure – The Keynesian Cross

The following table gives some information regarding GDP, Consumption (C), Taxes (T), Transfers (TR), and Investment (I) in the autarkic (no imports or exports) nation of Haagland.

Year	GDP or Y	C	T	TR	G	I
2014	\$350	\$200	\$100	\$50	\$75	\$200
2015	\$450	\$250	\$100	\$50	\$75	\$200

- a) Given the above information, assuming that autonomous consumption and the marginal propensity to consume are constant, find an equation for consumption as a function of disposable income (Disposable Income = $Y_d = Y - (T - TR)$).
- b) Now, write the equation for consumption as a function of total income (GDP or Y).
- c) Finally write the private savings functions: first, as a function of disposable income, and then as a function of total income.
- d) Give the equation for Aggregate Expenditure (that is, find $AE = C + I + G$). What is the equilibrium level of GDP in this economy? Given this information, what was the change in inventories in 2014?
- e) Suppose now that you are an economist working for the government of Haagland. In 2016, the government wants to balance its budget. The two options are to either (1) reduce the amount of transfers to 25, or (2) reduce government spending to \$50. All else being equal and assuming that

aggregate expenditure is in equilibrium, which policy would you recommend as having the higher resulting GDP (according to the standard Keynesian analysis)? Plot the change in the aggregate expenditure curve for both. Assume that investment spending does not change.

f) The solution to part (e) depends on the difference between the government spending multiplier and the tax multiplier. Using your computations from the previous part what is the government spending multiplier and the tax/transfer multiplier? Why are they different? (Hint: think of how each dollar of additional spending flows through the economy and write out the first few terms of the sum). What does this imply about the government's ability to stimulate the economy while running a balanced budget according to the Keynesian model?

g) *Challenge question:* Page 347 of your textbook gives one way to derive an expression for the multiplier as a function of the MPC. Let's consider another way to derive it using the story you learned in lecture.

Consider how one additional dollar flows through the economy: the dollar is spent by the first person (the government suppose) contributing one dollar to GDP; that dollar is income for another individual who spends $1 * MPC$ of it; that $1 * MPC$ dollars now becomes income for a third person who spends $(1 * MPC) * MPC = MPC^2$ of it.

Repeat this process to express the total change in GDP as a sum of terms involving the MPC. To what does this sum converge? (Hint: look up "geometric series.")

2) Aggregate Supply and Demand

Plot each of the following scenarios on a qualitative graph with aggregate demand, short-run aggregate supply, and long-run aggregate supply. Measure the aggregate price level (P) on the vertical axis in your graphs and measure real GDP (Y) on the horizontal axis in your graphs. Then describe the way in which the economy will return to the long-run equilibrium if there is no fiscal or monetary policy intervention and include this long run adjustment in the same graph. Describe verbally what happens to output and prices in the short run and then the long run. For each scenario, assume that the economy starts in long run equilibrium, then moves to a short run equilibrium before returning to a long run equilibrium.

- a) A stock market panic results in many bank closures causing many people to lose their savings.
- b) Oil prices unexpectedly increase sharply and this causes an increase in production costs for many producers in the economy.
- c) A new computer technology improves the productive capacity of the economy.
- d) The government announces a higher than expected increase in GDP for last year, resulting in increased consumer confidence.

3) More Aggregate Supply and Demand

For most of this problem you are not *required* to graph anything, but it is strongly advisable in order to inform your algebra.

Suppose the small autarkic nation of Guam has the following equations describing certain aggregate economic quantities:

$$C = 300 - P + (1/4)Y$$

$$I = 200 - 20r$$

$$G = 50$$

$$M_d = 1000 - 100r$$

$$M_s = 500$$

$$\text{SRAS: } Y = P - 100$$

Where C is consumption, P is the aggregate price level (scale = 100), Y is GDP, I is investment, r is the interest rate (in percent), G is government spending, M_d is money demand, M_s is supply, and SRAS is the short run aggregate supply curve.

- a) Solve for the money market equilibrium. Using this interest rate, solve for the equilibrium level of investment.
- b) What is the equation for aggregate expenditure as a function of P and Y ? Find the equilibrium level of output as a function of prices (i.e. the aggregate demand equation).
- c) Using your solution from part (b), solve for the equilibrium level of output (Y^*) and aggregate price level (P^*). Assume that the current equilibrium output is also the long run output.
- d) Suppose now a major typhoon sinks a large oil tanker resulting in higher costs for producers leading the SRAS curve to shift to the left by 70 units of output at all prices. Solve for the new equilibrium output (Y^*) and aggregate price level (P^*).
- e) To speed recovery from this typhoon, the government decides to increase spending. By how much must the government increase spending to return the economy to the long run full employment output you found in (c)? Be careful here: you need an increase that is greater than our simple Keynesian model would predict given that the aggregate supply curve is upward sloping. Before you do your calculations you might want to draw a sketch of the problem. What effect will the disaster and following government policy have on the price level?
- f) Now, return to the scenario of part (d). Suppose the citizens of Guam oppose the original government spending recovery policy proposal. As a substitute policy, the Central Bank of Guam decides to conduct open market operations to manipulate the interest rate. In order to return the economy to its long run output, should the Central Bank buy or sell assets, and how much? What will be the resulting interest rate and price level? (You may need a calculator for parts of this problem.)

4) The Central Bank and the Money Multiplier

The small country of Emamade has a Central Bank, which manages the money supply, and a single depository institution, the Emamade Credit Union. Alice and Bob are the only two residents of Emamade and both use the Emamade Credit Union for their deposits. The initial T-Accounts for each of these institutions are given below:

<u>Central Bank of Emamade</u>			
Assets		Liabilities	
T-Bills	\$200,000	Reserves	\$200,000

<u>Emamade Credit Union</u>			
Assets		Liabilities	
Reserves	\$200,000	Alice's Deposits	\$500,000
T-Bills and other earning assets	\$800,000	Bob's Deposits	\$500,000

All transactions in Emamade occur through checks so there is no currency ever in circulation. Additionally, the Credit Union never holds excess or insufficient reserves.

- a) Given the information above, what is the monetary base (the monetary base is defined as the amount of reserves held by banks in this example) in this economy? What is the money supply, M2, where M2 consists of all currency in circulation plus demand deposits? Given this, what is the money multiplier for this economy?
- b) Given the information above, what is the Credit Union's reserve requirement?
- c) Suppose that Alice decides to purchase a car from Bob's car dealership for \$50,000 (using a check). Write the new T-account for the Credit Union given this change. How does this change affect the Credit Unions assets? Does it now hold insufficient or excess reserves?
- d) Return to the original scenario (before Alice purchased her car in part (c)). The Credit Union of Emamade is an especially responsible depository institution, and its depositors have a great deal of faith in its solvency. In light of this, the Central Bank decides to cut the Credit Union's reserve requirement in half. Write the new T-account for the Credit Union assuming that Alice and Bob both benefit equally from the new loans the Credit Union provides. What is the new level of the money supply (M2)? What is the new money multiplier?
- e) Given the change in part (d), how might you expect the aggregate demand curve of Emamade to react? What might you expect to happen in the short and long runs to prices and output?

f) Let's again return to the original scenario (before the reserve requirement change). The Central Bank is now concerned that Emamade's economy is performing below the long-run trend, and thus decides to increase Emamade's monetary base to \$400,000. What policy must the Central Bank undertake to get this new currency to the Credit Union? After undertaking such a policy, does the Credit Union hold insufficient or excess reserves? Write the new T-accounts for both the Central Bank and Credit Union based solely on the Central Bank's activity.

g) Given the result from (f), what will the Credit Union do to eliminate any insufficient or excess reserves? Write the new T-account for the Credit Union assuming again that the deposits of Alice and Bob are both adjusted equally.