

# Economic 1102-27 - Principles of Macroeconomics

## Midterm Exam 2 Answer Key

April 19, 2012

### 1 Question Set 1 (20 points, 4 RP): Definitions

**Instructions: Provide the most complete answer you can.**

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**1.1** (4 pts) *Define diversifiable and non-diversifiable risk, and provide an example of each.*

Diversifiable risk is risk that can be reduced by investing in assets that are unlikely to fail or succeed together (i.e. diversify your risk). An example is investing in Apple and Microsoft stock.

Non-diversifiable risk is risk that is systemic and affects the entire risky asset system together. An example is risk from the potential of a recession.

**1.2** (5 pts) *State the quantity theory of money. Provide the equation justifying the theory and explain why the equation supports the theory.*

The quantity theory of money claims that prices are directly determined by the quantity of money available, and inflation by the growth rate of the money supply.

$MV = PY$  is used to justify this relationship because we assume that  $V$  and  $Y$  are approximately fixed so  $P$  is directly related to  $M$ .

**1.3** (3 pts) *Define expansionary monetary policy.*

An expansionary monetary policy seeks to close recessionary gaps through expansion of the money supply, which in turn decreases interest rates, and thus increases investment and aggregate demand.

**1.4** (3 pts) *What is the discount rate? How does it affect real interest rates?*

The discount rate is the the interest rate on loans from the Fed to private banks.

One direction of the mechanism (only look for one): As the discount rate increases, banks are less willing to take out these loans, which decreases funds available for loans, which in turn increases interest rates. The opposite is true for a decrease in the discount rate.

**1.5** (2 pts) *Provide a definition for business cycles.*

Business cycles are deviations from the natural rate of growth or output. (Also acceptable, recurring increases and decreases in the level of economic activity)

- 1.6 (3 pts) List 2 types of money in M1 and 2 types of money in M2 (different than those you listed for M1). What is the defining difference between M1 and M2?

M1: Cash, checking accounts

M2: Time deposits, savings deposits, mutual funds

The difference is the liquidity of M1 types and M2 types

- 1 RP Is the US dollar a commodity or fiat currency? (Fiat)

- 2 RP List 2 of the 3 characteristics that define money. (Store of value, unit of account, medium of exchange)

- 1 RP Provide a formula for a GDP Gap. (GDP Gap=Short-run GDP - NRO)
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## 2 Question Set 2 (25 points, 5 RP): Short Answer

**Instructions: For open-ended questions, you must provide economic intuition from class as justification for your answers.**

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- 2.1 (7 pts) The Bank of Japan Governor Masaaki Shirakawa recently (last week) issued a warning at a Federal Reserve conference: "If low interest rates induce investment projects only profitable at such interest-rate levels, this could have an adverse impact on productivity and growth potential of the economy." What are two effects of zero-interest rate monetary policy? Use monetary models from class to justify your claim.

Two potential answers: 1) Expansionary monetary might be impossible. Because we cannot have negative nominal interest rates, if interest rates are zero then an expansion in the money supply from some Fed action cannot further decrease interest rates. If interest rates cannot decrease, then investment will not change and so aggregate demand will not change. 2) Low interest rates do not encourage savings, which may in turn lead to an increase in government debt which is counterproductive to the goal of expanding investment.

- 2.2 (6 pts) For the following three questions suppose you are a macroeconomist (again, not for too long!) advising a policymaker: Suppose the policymaker, hoping to drive down unemployment, wants to urge the Fed to increase the money supply. Provide two distinct points suggesting that his plan is ill advised.

Two potential answers: 1) In the long-run, the unemployment rate returns to the natural rate of unemployment so the policy will lead to higher prices with no employment gains in the that time frame. 2) Higher inflation can leader to higher expectations of inflation, which will shift the Phillips curve right. So, higher levels of inflation will be required to obtain a fixed level of unemployment in the short-run.

- 2.3 (6 pts) Now suppose he has suggested introducing a round of tax cuts with the hope of stimulating the economy enough to increase income and thus tax revenue (despite the cuts). Would you advise him for or against this plan? Would his plan achieve its goal?

The answer should reference the Laffer curve. Specifically, if we believe we are on the "right side of the curve," then it would be a good plan. A decrease in taxes increases the incentive to work so revenue might increase because there is more income to tax. On the left side of the curve, the reduction does not increase the incentive to work sufficiently to cover the loss in the lower tax rate.

- 2.4** (6 pts) Finally, this busy policymaker has suggested introducing a balanced-budget resolution to the US Congress. Should the bill pass, provide him with at least one positive and negative side-effect of the new policy.

Some potential positives: Debt can be lowered over time or at least not continue to accumulate; reduction of crowding out effect in fiscal policy. One potential negative effect: countering recessions can be less effective if spending = revenue.

**3 RP** List three types of costs induced by inflation. (Shoeleather, menu, relative-price variability, inconvenience and confusion, inflation induced tax distortions, unexpected inflation)

**2 RP** What do monetarists claim is the cause behind business cycles? Give an example. (Bad government policy; for example, imposing a minimum wage may force some businesses to fire workers and lower output rather than offer lower wages)

### 3 Question Set 3 (35 points, 8 RP): Policies in Action

**Instructions: You must show all of your calculations for full credit.**

*Appleland is in a recession (!) because of a fall in investor confidence. Use the data on Appleland to execute and to assess various policies to close Appleland's recessionary gap. Note: If students carry mistakes from previous questions, do not further penalize them if the process is correct.*

- 3.1** (5 pts) Suppose Congress has decided to function properly and generate a fiscal policy to close the recessionary gap through a change in household taxes. How much must Congress change taxes to close the gap completely. Assume no crowding out.

Want  $\Delta GDP = 300$  and  $\Delta GDP = CISOM * \frac{1}{1-MPC}$  so  $300 = CISOM * \frac{1}{1-.5}$  and thus  $CISOM = \Delta C = \$150$ . Since  $\Delta C = MPC \cdot \Delta T$  we have  $150 = .5\Delta T$  so  $\Delta T = \$300$ . Therefore, Congress should offer tax cuts of \$300.

- 3.2** (12 pts) The Federal Reserve generates its own plan using open market operations to close the recessionary gap completely. Calculate the value of the sale or purchase (and indicate which it does) of government bonds. Assume banks are lending out as much as possible.

From part a, we know that we want to change the initial spending in the output market by \$150 so  $\Delta I = \$150$ . Now, start with the initial conditions, move on to the desired, and conclude with the correct OMOs the Fed needs to conduct.

Initial conditions:  $MS = Deposits * \frac{1}{RR} = 200 * 10 = \$2000$ . Since  $MS = MD$ ,  $2000 = 3000 - 5000i$  so  $i = .2$ . Finally, apply these interest rates to loanable funds demand to figure out the original investment level.  $I = 2000 - 6000 * .2 = \$800$ .

Desired conditions: We found out we want to change  $I$  by \$150 so the new level of investment  $\hat{I} = I + \Delta I = 150 + 800 = \$950$ . By the loanable funds demand = Investment condition, we now have  $950 = 2000 - 6000\hat{i}$  so the new interest rate  $\hat{i} = .175$ . Finally, the interest rates can be applied to the money market to determine the desired level of money supply.  $\hat{M}S = \hat{M}D$  so  $\hat{M}S = 3000 - 5000 * .175 = \$2125$ .

Fed Policy: The Fed can use open market operations to increase the deposits in banks so the money supply reaches its desired level calculated. So  $\hat{M}S = MM * \hat{D}ep$  and  $2125 = 10 * \hat{D}ep$ . Therefore,  $\hat{D}ep = \$212.5$ . To increase the level of deposits from \$200 to \$212.5, the Fed should **buy** \$12.5 in bonds from the banks.

- 3.3** (4 pts) Because of the fall in investor confidence, the Fed anticipates banks will not lend out as much as they were before the new policy was enacted. How would your answer to 3.2 change in this situation (no need for a numerical answer)?

If banks are not lending out as much as they were before, the money multiplier is overstating how much supply is created from initial deposits. Therefore, an even higher injection of deposits is needed to achieve the policy. Therefore, the Fed should buy more bonds than indicated in 3.2.

- 3.4** (10 pts) Suppose after the actions in 3.1 the new equation for money demand is  $(3000 + \Delta AD) - 5000i$ , and money supply has not changed from the original state. Calculate the decrease in investment. What is the net effect (after the investment change and change because of taxes) on GDP? (Hint: Many of the initial conditions used in 3.2 can be used here.)

From 3.2 we know that the initial money supply is \$2000 so by  $MS = MD$  we can derive interest rates with the new demand:  $2000 = 3300 - 5000i$  so  $i = .26$ . Apply to loanable funds demand:  $2000 - 6000 * .26 = 440 = I$ . From the 3.2, we know initial investment is \$800 so the change in investment is  $-\$360$ . Use  $\Delta GDP = CISM * \frac{1}{1-MPC} = (\Delta C + \Delta I) * 2 = -210 * 2 = -\$420$ . So the net effect of the government policy is to further reduce GDP by \$420.

- 3.5** (4 pts) Consider again your answer in 3.1. Suppose Congress wanted to maintain a balanced budget by paying off its new debt from 3.1 with newly printed money, i.e. will increase money supply by that amount. Assuming velocity is constant at 2 and GDP is fixed at the level you achieved through the policy in 3.1, what is the initial and resulting price level?

Simply need to use  $MV = PY$ .  $2M = 6000P$  so  $M = 3000P$ . Initially,  $M = 2000$  so  $P = 2/3$ . After the change in money supply by \$300 to pay off its debt,  $P = 23/30$ . So  $P$  has increased.

**3 RP** List and define the three types of lags in managing fiscal policy. (**Recognition - time to realize recession has started, Administrative - time to pass the stimulus package, Operation - time for the bill to take effect**)

**2 RP** Provide two examples of automatic stabilizers. (**E.g. unemployment benefits, progressive tax system**)

**3 RP** What is the primary difference between the real business cycle and neo-Keynesian explanation of business cycles. What is the implication for appropriate fiscal policy during a recession? (**Real business cycles claim shocks to real variables cause fluctuations, neo-Keynesians blame a change in aggregate demand or short-run aggregate supply and have a subsequent delay in adjustment to equilibrium because of sticky prices. neo-Keynesians would suggest fiscal policies address demand as we have said in class. RBCist would claim that would not change real output since the problem is not with demand**)

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## 4 Question Set 4 (20 points): Calculations

**Instructions:** Use the provided data about Macworld at the end of the test packet to answer the following questions when necessary. To obtain full credit, you **MUST** show how you obtained your answer.

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- 4.1 (3 pts) Suppose Steve has won the (small) lottery. He can take \$100 today or \$50 payments over the next 3 years, including this year. Determine which option he would choose with the following interest rates: 50%, 70%

We need to calculate the present value of the second option that is time delayed.  $PV(\$50\text{choice}) = 50 + \frac{50}{1+.5} + \frac{50}{(1+.5)^2} = \$105.55$  so Steve would pick the second option with the 50% interest. With 70% interest  $PV(\$50\text{choice}) = 50 + \frac{50}{1+.7} + \frac{50}{(1+.7)^2} = \$96.71$  so Steve would pick the first option.

- 4.2 (4 pts) Suppose Steve decided to take the \$100 today and found more attractive investment options. Assuming he can only choose one of the following, which option would Steve choose?

- A T-bill paying 5% real interest the first year and 7% real interest the second year
- A stock that will return in **two** years  $i = -1$  with 10% probability,  $i = .5$  with 30% probability,  $i = .12$  with 60% probability

Need to calculate the value of the two options. Option 1:  $Yield = ((100 * (1.05)) * (1.07)) = \$112.35$  (make sure they realize there is compound interest). Option 2:  $E[Yield] = 100 * .1 * (1 - 1) + 100 * .3 * (1 + .5) + 100 * .60 * (1 + .12) = \$112.2$ . So Steve would pick the first option.

- 4.3 (4 pts) Suppose the natural rate of unemployment is 5%. Compare unemployment levels in Macworld when i)  $A = 1$ , actual inflation is 5%, expected inflation is 3%, and ii) expected inflation decreases to 1% because of the announcement of a contractionary Fed policy.

Note  $UR = NRU - A(\text{Actual} - \text{Expected})$ . i)  $UR = 5 - 1(5 - 3) = 3\%$ , ii)  $UR = 5 - 1(5 - 1) = 1\%$ .

- 4.4 (3 pts) Determine CPI inflation in Macworld from 2007 to 2010.

First note cost of livings (COS) for each year:  $COS_{2007} = 3*30 + 800 = 890$ ,  $COS_{2010} = 3*5 + 850 = 865$ .  $CPI_{2007} = 100$  (because it is the base).  $CPI_{2010} = \frac{COS_{2010}}{COS_{2007}} * 100 = 97.2$ .  $Inflation(2007 \text{ to } 2010) = \frac{CPI_{2010} - CPI_{2007}}{CPI_{2007}} * 100 = -2.8\%$ .

- 4.5 (3 pts) If the market basket changes to be 1 MacBook and 2 iPhones, determine CPI inflation in Macworld from 2007 to 2010. How does it compare with 4.4's answer?

Now  $COS_{2007} = 2 * 100 + 800 = 1000$  and  $COS_{2010} = 2 * 120 + 850 = 1090$ . So  $CPI_{2007} = 100$  and  $CPI_{2010} = \frac{COS_{2010}}{COS_{2007}} * 100 = 109$ .  $Inflation(2007 \text{ to } 2010) = \frac{CPI_{2010} - CPI_{2007}}{CPI_{2007}} * 100 = 9\%$ . So inflation is higher under the new market basket.

- 4.6 (3 pts) Suppose Steve earned \$10000 in 2007, and a wage of \$15000 in 2010. In real terms has his wealth increased or decreased from 2007 to 2010? Does your answer depend on if the market basket uses 2 iPhones or 3 Nokias?

We need to calculate wage in terms of 2007 dollars to determine his change in wealth. Note  $Wage_{TimeT}$  (in base dollars) =  $15000 * \frac{COS_{base}}{COS_{yearT}}$ . Under the first basket,  $Wage_{2010}(USD_{2007}) = 15000 * \frac{890}{865} = \$15433.53$  so real wealth has increased. Under the second basket,  $Wage_{2010}(USD_{2007}) = 15000 * \frac{1000}{1090} = 13761.47$  so real wealth has increased. The answer does not depend on the market basket measure.

## Data for Section 3 and 4

Figure 1: **Appleland's Economy**

**Statistics about Macworld immediately after the beginning of the recession:**

Natural Rate of Output: \$6000	GDP Gap: -\$300
Money Demand = 3000 - 5000i	Loanable Funds Demand = 2000 - 6000i
Initial Deposits = \$200	MPC = .5
Reserve Ratio = .1	

Figure 2: **Macworld's Economy**

**We have the following information on Appleland:**

Note: The market basket is 3 Nokia phones and 1 MacBook.

Year	iPhones Produced	Nom. Price of iPhones	MacBooks Produced	Nom. Price of MacBooks	Nokia Phones Produced	Nom. Price of Nokia Phones
2007*	100	\$100	150	\$800	300	\$30
2010	1000	\$120	190	\$850	200	\$5

\*Base year