

Economics 302: Macroeconomic Analysis
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Problem Set #3

Due: Wednesday, November 17, 2004

1. To answer the following question, collect quarterly U.S. data on the following variables from 1959Q1 – 2004Q2:

- Nominal money supply (i.e. a narrow measure such as M1)
- Aggregate price level (i.e. GDP deflator)
- Real GDP
- Short-term nominal interest rate (i.e. 3-month government bond rate)

Note: Check that your variables are measured in comparable units; that is, real money balances (M/P) and real output (Y) should be in the same units (say, billions of 2000 dollars).

- (a) Recalling that $V = PY/M$, compute velocity for the U.S. and plot it over your full sample period (preferably in EViews). Based on your graph, would you interpret the U.S. data as supporting the assumptions of the Quantity Theory? Why or why not?
- (b) A relatively simple — yet common — specification of a money demand relationship can be written as:

$$\ln(M_t/P_t) = \beta_0 + \beta_1 \ln Y_t + \beta_2 i_t + \varepsilon_t,$$

where M_t/P_t is real money balances in period t , Y_t is real output, and i_t is a nominal short-term interest rate. Using the data you collected, estimate this regression equation and report your estimated results. Interpret the coefficient estimates economically. Do your estimates imply a steep or flat LM curve? Explain.

- (c) Blanchard often writes the equation for money demand as $M/P = L(i) \cdot Y$, implying a unit income elasticity for money demand. Test the null hypothesis that the elasticity of money demand with respect to real income is one in the above regression equation. Do you reject this null hypothesis or not? Explain.
- (d) Test your estimated model in part (b) against the Quantity Theory of Money. Letting the Quantity Theory be the null hypothesis, can you reject the restriction(s) implied by this hypothesis? Explain.
- (e) Suppose that instead of supplying money exogenously, the Federal Reserve lowered the money supply whenever the economy was in a boom (i.e. above-average output and/or price level) and raised the money supply when the economy was in a bust (i.e. below-average output and/or price level). How would this policy behavior change your answers for part (b)? Explain.
2. A number of large industrialized countries, including the U.S., Japan, and Germany, recently experienced very low nominal interest rates in the midst of economic slowdowns.

- (a) What does the LM relationship look like as i approaches zero? (*Hint*: Can the nominal interest rate ever be negative? Why or why not?)
- (b) Suppose an economy was in recession at a point in which the nominal interest rate were nearly zero. What would be the effect on real output of an expansion of the nominal money supply in that case? In the IS-LM framework, what other policies — if any — could be used to pull the economy out of recession? Illustrate graphically.
3. With the 2004 U.S. national election resulting in Republican control of the presidency and Congress, the 2001 income tax cuts likely will become “permanent” (as opposed to expiring in 2011 as originally planned). Use the IS-LM and AS-AD models to illustrate your answers to each of the following questions. (Assume a closed-economy, and that the tax policy has no effect on the supply side of the economy.)
- (a) For consumers who behave according to a simple Keynesian consumption function, what are the macroeconomic impacts of changing the status of the tax cuts from temporary to permanent? Explain both the immediate (fixed P) and longer-run (flexible P) consequences. Use graphs as necessary to illustrate your answers.
- (b) Repeat your analysis of part (a) for consumers who behave according to the Permanent Income Hypothesis.
4. How would the IS-LM model differ for an open economy? In that case, the NIPA identity includes net exports: $Y = C + I + G + NX$. Net exports, in turn, are a function of domestic output (Y), foreign output (Y^*), and the real exchange rate (ϵ). For this problem, treat all foreign variables as exogenously determined.
- (a) All else equal, how does the fact that net exports depend upon domestic income affect the slope of the IS relationship? That is, does the inclusion of imports (as a function of Y) make the open-economy IS curve steeper or flatter than the closed-economy IS curve? Explain.
- (b) In a short-run model with sticky domestic prices (and exogenous foreign prices), the real exchange rate will vary with the nominal exchange rate. The nominal exchange rate, in turn, is related to the nominal interest rate via the uncovered interest parity condition. Use the definition of the real exchange rate and the UIP condition to solve for the real exchange rate as a function of the nominal interest rate and other exogenous or fixed (in the short-run) variables. Does an increase in i lead to an appreciation or depreciation of ϵ ? Explain.
- (c) All else equal, how does this second channel for the nominal interest rate (through the value of the real exchange rate) affect the slope of the IS curve? (Recall that the IS curve is downward-sloping in the closed-economy model due to the negative effect of higher interest rates on investment demand.)
- (d) Are the fiscal policy multipliers larger or smaller in an open-economy IS-LM model? Explain. Does your answer change if imports are a function of disposable income ($Y - T$) rather than total income (Y)?