

Ph.D. Core Exam – Macroeconomics
16 August 2010 – 8:00 am to 3:00 pm

Part A: Answer two of the following three questions.

A1. Policy Effectiveness

Following the 2007-2008 financial meltdown, policymakers have adopted a combination of expansionary fiscal and monetary policies in an effort to stabilize or stimulate their national economies. The effectiveness of these policies is a matter of theoretical and empirical debate. Your task is to evaluate the question of policy effectiveness at the theoretical level by considering the following short-run macro models.

1. *Closed economy with fixed wage and prices:* Assume the economy is described by an IS-LM model with static inflationary expectations ($\pi^e = d\pi^e = 0$) and a wealth effect in the goods market. Real wealth is held in the form of real money balances ($V = M/P$). The capital stock and technology are fixed.

$$Y = E(Y - T, r, V, G) \quad (\text{IS})$$

$$M/P = L(Y, R) \quad (\text{LM})$$

where $r = R$, $0 < E_{Y-T} < 1$, $0 < E_V < 1$, $E_r < 0$, $E_G = 1$, and $L_Y > 0$, $L_R < 0$.

Analyze the effects of ~~a debt-financed fiscal expansion~~ ^{the combined monetary & fiscal expansions} on the endogenous variables by

- calculating and signing the relevant derivatives.
- illustrating graphically and explaining verbally why and how the economy responds to the expansionary policies.
- explaining how your answer changes if there is no wealth effect in the goods market.

2. *Small open economy with fixed wages and prices:* Assume the economy is described by a standard Mundell-Fleming model with static inflationary expectations ($\pi^e = d\pi^e = 0$), and static exchange rate expectations ($de^e = 0$)

Using detailed verbal explanations and graphs, analyze the combined effects of the fiscal and monetary expansions on the endogenous variables under:

- fixed exchange rates.
- flexible exchange rates.

Be sure to discuss the role of capital mobility in each case.

A2. Statements

Select any four (4) of the following statements and explain carefully why each is either true, false, or indeterminate. You are expected to use graphical and/or mathematical analysis to support your arguments. Your score depends on the quality and completeness of your explanations.

1. In the classical model, money is always neutral and superneutral.
2. Complete crowding out occurs only in the classical model.
3. Rational expectations models of aggregate demand/supply imply that the repeated use of “surprise” policies can contribute to greater instability in the economy.
4. Under fixed exchange rates, policymakers in a small open economy should use sterilization policy in the face of domestic IS-shocks if capital is relatively mobile.
5. Whether the optimal policy is a fixed rule or a feedback rule depends on the nature of the uncertainty, the number of policy instruments, and the expectation formation mechanism.
6. According to the basic Barro-Gordon model, the time-consistent equilibrium inflation rate will be higher the greater the effect of unexpected inflation on unemployment.

A3. Macro-Dynamics

The basic AD-AS macroeconomic model focuses on the interactions of several aggregate markets. In a closed-economy model, these are the product (i.e., goods and services), financial, and labor markets. The recognition that it takes longer for equilibrium to be established in some of these markets than in others results in interesting macro-dynamics, in which the responses of some variables to an exogenous shock are very different in the short-run from what they are in the long-run. The time paths of these variables following a shock may be non-linear, with “overshooting” occurring in some cases.

1. Define and explain what full long run equilibrium would be in each of these three markets (product, financial, and labor).
2. For an economy like that of the U.S., try to rank these markets in terms of the speed with which each one is likely to return to equilibrium following an exogenous change.
3. Using this ranking, show either graphically or algebraically the effect of an increase in the money supply on:
 - a) the price level
 - b) nominal interest rates
 - c) real income and employment
 - d) real wages
4. Sketch out briefly how your answer to question (3) might be affected by the expectations formation process.

Part B: Answer BOTH questions.

B1. Consider the Ramsey model of an economy in competitive equilibrium. There is a representative household and a representative firm. Assume there is no population growth ($n = 0$). The household's utility functional is

$$\int_0^{\infty} \frac{c(t)^{1-\theta} - 1}{1-\theta} e^{-\rho t} dt, \quad (1)$$

and the firm has a constant-returns-to-scale production function $Y(t) = F[K(t), L(t)]$. Assume one unit of output that is not consumed becomes $\sigma < 1$ units of capital. We can think of the parameter σ as measuring the efficiency of the financial sector.

a) Write down representative household's maximization problem and derive the four equations that characterize the solution. Does σ appear here? Remember that the assets of the household $A(t)$ is measured in units of output, not in units of capital.

b) Write down firm's maximization problem and the first-order conditions for this problem. Translate these conditions into intensive form. Does σ appear here?

c) The equilibrium conditions for this economy are given by

$$N(t) = L(t), \quad (2)$$

$$K(t) = \sigma A(t)$$

or, in intensive form,

$$k(t) = \sigma a(t), \quad (3)$$

and

$$R(t) - \frac{\delta}{\sigma} = r(t). \quad (4)$$

Carefully explain, interpret, and discuss these conditions.

d) Combine your answers to parts (a) - (c) and derive a pair of differential equations for the variables k and c .

e) Do the following comparative dynamics exercise: $\sigma' > \sigma$. As usual, the baseline economy starts in the steady state at time $t = 0$. The new economy starts at time $t = 0$ with the same amount of capital as the baseline economy. Draw (i) the phase diagram for both cases, indicating what is different, and (ii) the time paths of c and k for both cases. If necessary, assume that the substitution effect dominates the income effect. Discuss.

B2. Consider the Diamond-Dybvig model with two assets. There are three periods: $t = 0, 1, 2$. Agents are ex-ante identical. They are endowed one unit of a single good at $t = 0$, and nothing at $t = 1, 2$. At the beginning of $t = 1$, a fraction ϕ_1 of agents learn that they prefer to consume only at $t = 1$, while a fraction ϕ_2 of agents prefers to consume only at $t = 2$. There is a linear production technology whereby one unit of the good invested in period 0 yields $R > 1$ units of the good at time 2. This technology is illiquid, in the sense that an investment that is interrupted in period 1 generates $r < 1$ units of consumption. In addition, there is a liquid storage technology, whose return is equal to 1 in both periods. Agents are expected utility maximizers, and their preferences are given by

$$U = \phi_1 \frac{c_1^{1-\theta} - 1}{1-\theta} + \rho \phi_2 \frac{c_2^{1-\theta} - 1}{1-\theta} \quad (5)$$

where $\rho < 1$ is a discount factor, and $\theta > 0$.

a) Write down the problem of an agent in autarky, the FOC, and the optimal consumption vector (c_1, c_2)

b) Now suppose that in period 1, after agents learn their idiosyncratic consumption preference shock and before they consume, a financial market opens where agents can trade claims for the returns on the illiquid production technology. Let p be the price of a bond that yields one unit of the illiquid production technology at $t = 2$. Write down the problem of an agent in this setting. What will the equilibrium price of a bond be in this case (and why)? What is the consumption vector (c_1, c_2) ? discuss.

c) Now, instead of a financial market, suppose agents form coalitions, which they call banks, and pool their resources. Write down the problem of the bank, the FOC, and the optimal consumption vector. Briefly compare with a) and b).

d) Under what conditions can multiple equilibria exist? Define narrow banking in this context. Is it preferred to autarky? Discuss. What about suspension of convertibility?