MACROECONOMICS QUALIFYING EXAM
7007 Section

Required Question. Consider a simple economy of N identical worker-investor-consumers. Each is endowed with 1 unit of labor power and with nominal money m_o. Workers offer their labor to a single firm independently of the wage rate. The single firm produces a consumption good Y according to the production function

$$Y = \sqrt{(1-u)N},$$

where u is the unemployment rate. Taking the wage rate and price as given, the firm maximizes profit.

In their role as investors, all workers receive equal shares of the firm's profit,

$$\Pi = pY - w(1-u)N$$

where p is the price of the consumption good produced and w is the nominal wage.

In their role as consumers, everybody allocates their budgets between consumption c_i and real money balances according to the utility function

$$U_i = \sqrt{c_i\left(\frac{m_i}{p}\right)},$$

where m_i is the nominal money balance held by the i^{th} consumer. Consumers face the budget constraint

$$(1-\lambda)\left(w + \frac{\Pi}{N}\right) + m_o = pc_i + m_i,$$

where λ is the income tax rate. The consumption decision is made according to competitive assumptions; that is, consumers take w, p, λ and Π as given. Unemployed consumers do not earn wages, but still receive their share of profit.

According to the constitution of this society, there is no government spending, although income taxation is permitted. Equilibrium in the goods market is described by

$$Y = C = \sum_{i=1}^{N} c_i .$$

The government controls the supply of nominal money, so that equilibrium in the money market is given by

$$M = \sum_{i=1}^{N} m_i .$$

Model One: For parts (a) through (d), assume that u=0 and that p, w, Y, C and λ are endogenous, while M, m_o and N are exogenous.

(a) For this microeconomic the aggregate consumption function is

$$C = \frac{1}{2}\left((1-\lambda)Y + \frac{M_o}{p}\right),$$

and the money market equilibrium is

$$\frac{M}{p} = \frac{1}{2}\left((1-\lambda)Y + \frac{M_o}{p}\right).$$

Explain the logic basis of these equations.

(b) Can the Quantity Theory of Money be derived from these equations? If so, what is the implied *velocity of money*? Discuss.

(c) If the money supply M is exogenous, then the tax rate λ must be endogenous. Explain why.

(d) Given that u=0, M=150, m_o=1, and N=100, find the equilibrium values for p, w, Y, C and λ. Illustrate your answer and discuss.

Model Two: For parts (e) and (f), now assume that p, u, Y, C and λ are endogenous, while w, M, m_o and N are exogenous.

(e) Find the aggregate supply curve $p = S(Y)$. Show that this equation can be reinterpreted as a Phillips curve. Illustrate your answer.

(f) Explain why monetary policy is effective in this economy.

(g) Discuss the microfoundations of these models. Which model (*One* or *Two*) has the more adequate foundations?

Answer *one* of the *three* questions below.

Question 1.

> … Thus we can sometimes regard our ultimate independent variables as consisting of (1) the three fundamental psychological factors, namely, the psychological propensity to consume, the psychological attitude to liquidity and the psychological expectation of future yield from capital assets (2) the wage-unit as determined by bargains reached between employers and employed, and (3) the quantity of money as determined by the action of the central bank ….
>
> Keynes (1936)

(a) Discuss the meaning of the term "independent variable."
(b) Relate this quote to Sargent's classical model. Use diagrams or equations as appropriate.
(c) Extend your discussion to Sargent's Keynesian model.

Question 2. Consider a two-equation endogenous stabilization model:

$$\pi = E\pi + x + \varepsilon \qquad \text{Phillips curve}$$

$$\pi = \frac{1}{2}\left(x^T + E\pi + \varepsilon\right) \qquad \text{government's policy rule}$$

where the endogenous variables are:

π = the inflation rate,
x = the GDP gap;

and the exogenous variables are:

ε = a price shock,
$E\pi$ = expected inflation,
x^T = the government's output target.

(a) Discuss the logic of this model. Show that the government's policy rule can be derived as a constrained optimization problem when the government's objective function is

$$U = -\left(x - x^T\right)^2 - \pi^2$$

Illustrate your answer with a diagram.
(b) Can the *deflationary trap* concept be explained by this model?
(c) Contrast the assumptions about the formation of expectations made by the new Keynesian and new classical schools of thought. Discuss the impact of these expectation assumptions on macrostabilization. Illustrate your answer with a diagram.

Question 3. Consider a simple macroeconomy:

$$\frac{w}{p} = F_N(N), \quad \text{labor demand,} \quad F_{NN} < 0,$$

$$Y = F(N), \quad \text{production function,} \quad F_N > 0,$$

$$\frac{M}{p} = m(Y), \quad \text{money market equilibrium,} \quad m_Y > 0,$$

where $\frac{w}{p}$, Y and p are endogenous; and N and M are exogenous. All variables are labeled as in Sargent.

(a) Obtain the total differential of these equations. Write these differentials as a matrix equation, ***Jdy=dx***, where ***J*** is the Jacobian matrix, ***dy*** a vector of endogenous partials and ***dx*** a vector of exogenous partials. Find the Jacobian determinant. Evaluate your result.

(b) At this equilibrium, evaluate $\frac{\partial Y}{\partial M}$ and $\frac{\partial p}{\partial M}$. Interpret your results and illustrate your answer with a diagram.

(c) Discuss the extent to which this model has microfoundations. Is this a classical or Keynesian model. Does it exhibit neutrality? Dichotomy?

ECON 7008 Macroeconomics 2 Spring 2014 Qualifying. Rudi von Arnim.

1. **Demand and distribution**
   Throughout, make further assumptions as needed. As usually, consider stability and dynamics, restrict parameters as necessary and draw diagrams to illustrate. For each question, briefly discuss key assumptions and model characteristics.

   (a) Formally present a neo-Kaleckian model of output determination.

   (b) Formally present a model of conflict inflation, based on the assumptions that (1) productivity growth is zero, (2) workers "adjust" nominal wage inflation according to deviations from their *endogenous* target distributive share, (3) firms "adjust" price inflation according to deviations from their *exogenous* target distributive share.

   (c) Discuss neo–Kaleckian output determination and conflict inflation in a 2–dimensional system of differential equations.

   (d) Consider instability in the goods market adjustment process "near" the steady state but stability "further away" from it.

2. **Essay: Trend & cycle.**
   Consider the following two excerpts:

   The development of Goodwin's nonlinear economic dynamics originated in Harrod's twin horns: The Trade Cycle (Harrod, 1936) and An Essay in Dynamic Theory (Harrod, 1939). Harrod, as Goodwin always insisted, had correctly posed the essential macrodynamic problem of growth and fluctuations. This was to recognise that cycles were due to the interaction between an unstable accelerator, a stabilising multiplier and the constraints of full employment in a growing economy. However, lacking the mathematics to encapsulate this interaction, Harrod was forced to leave the 'twin horns' to posterity as separate theories of the cycle and growth, respectively. The former evolved as the standard multiplier-accelerator theory of macroeconomic fluctuations; the latter, depending on the closures chosen, as either the Neo-Keynesian or the Neo-Classical theories of growth. (Velupillai, V. (1998), "Richard M. Goodwin, 1913–1996," Economic Journal, p.1438.)

   It is sometimes claimed that a reliance on external shocks leaves the cycle unexplained and that endogenous theories are therefore intrinsically superior from a methodological perspective. The claim is not convincing. Unforeseen shocks do hit the economy; some of these shocks must be considered exogenous, and it is easy to set up plausible propagation mechanisms that convert random shocks into irregular cyclical fluctuations. (Skott, P. (2011), "Post–Keynesian theories of business cycles," U/Mass Working Paper 2011-21)

   In light of these observations (and our discussions throughout the past months), critically discuss issues relating to *growth* and *cycle* and their *endogenous* or *exogenous* nature.