

## Macro 7008 Qualifier, June 2018

### 1. Foundational frameworks, 18pts. *Answer one.*

- (a) Provide comprehensive formal detail (incl. diagram) on Kaldor's trade cycle.
- (b) Provide comprehensive formal detail (incl. diagram) on Goodwin's growth cycle.

### 2. A hop, skip and jump from supermultiplier to financial cycles. *Answer all.*

- (a) **18pts** Consider the following system:

$$\hat{u} = y(u, h, z) - g(u) \tag{1}$$

$$\hat{h} = \gamma(u - \bar{u}), \tag{2}$$

where hats denote growth rates,  $u \equiv Y/K$ ,  $h \equiv I/Y$ ,  $z$  is the *exogenous* growth rate of autonomous demand (i.e., capitalist consumption),  $y(u, h, z)$  is the growth rate of real output with  $y_u > 0$ ,  $y_h < 0$ ,  $y_z > 0$ ,  $g(u)$  is the growth rate of the capital stock with  $g' > 0$ ,  $\gamma > 0$  a speed of adjustment parameter, and  $\bar{u}$  is the firm's desired income-capital ratio. Assuming own-stability of  $u$ , provide details on local stability and dynamics, sketch a phase diagram and briefly explain.

- (b) **18pts** Next, consider

$$\hat{u} = y(u, z(q)) - g(u, q) \tag{3}$$

$$\hat{q} = f(u, q) - g(u, q), \tag{4}$$

where  $q \equiv P_e E / PK$  is Tobin's  $q$ , i.e. the ratio of market valuation of capital stock relative to its replacement cost. The rate of growth of demand  $z$  now responds to financial conditions,  $z_q > 0$ , as does the rate of accumulation,  $g_q > 0$ . (Assume that, all things considered, the former effect is stronger than the latter, and continue to assume stability in  $u$ .)  $f(u, q)$  describes the formation of (deflated) market valuation; assume  $g_u > f_u > 0$  and  $g_q > f_q > 0$ . Provide details on local stability and dynamics; sketch a phase diagram; briefly explain.

- (c) **18pts** Lastly, consider again the system in  $u, q$ . Now, however,  $f$  is s-shaped in  $q$ , so that  $f_q > g_q > 0$  near the unique steady-state, but as above further away from it. Sketch a phase diagram; briefly discuss. (Assume throughout restrictions that guarantee  $|J| > 0$ .)

### 3. Essay, 28pts. *Answer at least one and at most two questions; provide coherent and substantial answers commensurate to the points offered.*

- (a) Compare and contrast the frameworks of question 1: What purposes do they serve, what questions do they answer? Is either model relevant for today's macroeconomic discourse? Critically discuss in the context of stylized facts, and the recent collapse of the labor share and decline of growth rates of real GDP.
- (b) Critically discuss the three models of question 2. How do they differ and relate, and what are their strengths and weaknesses?
- (c) Kalecki (1943), Friedman (1968) and Pollin (1998) all discuss the ability—or lack thereof—of governments to achieve target levels of output and employment. Critically discuss.

PART A: Answer one of the following questions:

1. The demand curve in industry  $i$  is  $Y_i = \frac{A}{n} - \frac{b}{2}p_i$ .  $A$  is aggregate demand and there are  $n$  identical industries.  $b > 0$ ,  $p_i \equiv P_i/P$ . All workers in industry  $i$  are in the  $i$ th union and the union maximizes  $w_i L_i$ . The union sets a monopoly real wage  $w_i$  ( $\equiv W_i/P$ ).

- Suppose there is Bertrand competition in the industry so that  $p_i = w_i/\beta$  where  $\beta$  is labor productivity (so  $L_i\beta = Y_i$ ). Derive the  $i$ th union's wage bargaining curve showing the wage it will set as a function of employment in the  $i$ th industry.
- Assuming Bertrand competition, what is the equilibrium employment rate in the economy? How does it change with labor productivity?
- Assume  $\beta = 1$ . Also assume now that there is a monopoly producer in each industry as well as a monopoly union. Derive the union's wage bargaining curve and the equilibrium employment rate.

2. Let the representative household's decision problem be:

$$\max U = \sum_{t=0}^{\infty} \left( \frac{1}{1+\rho} \right)^t \left( \frac{C_t^{1-\theta}}{1-\theta} - \frac{BL_t^\gamma}{\gamma} \right)$$

$$s. t. \quad C_t = w_t L_t + rA_t - (A_{t+1} - A_t)$$

$C$ : consumption;  $L$ : employment;  $A$ : total assets;  $w$ : real wage;  $r$ : real interest rate.  $0 < \theta < 1$ .  $B > 0$ .

- Derive the Euler equation to show how optimization implies consumption-smoothing.
- Show how optimization leads to "employment smoothing." How does your result relate to the real business cycle theory.
- Suppose there is a temporary negative productivity shock at  $t=\tau$ . How would this shock affect consumption, employment and savings at  $\tau$  and  $\tau+1$ . (Assume  $r = \rho$ .)

PART B: Answer two of the following questions:

3. There exists a variety of theories about involuntary unemployment. Write an essay that responds to the following questions:

- Some theories rely on nominal rigidities. Discuss two distinct examples of such theories, and how real wage responds to the business cycle according to each theory.
- Other theories rely on real rigidities. Discuss two distinct examples of such theories, and how real wage responds to the business cycle according to each theory.

4. "Chronic primary deficits are inconsistent with sustainable debt." Derive the debt sustainability conditions and discuss the consistency of primary deficits and government insolvency. (Assume that the Central Bank keeps real money supply constant).

5. "The 3-equation model is just a simpler version of the new neoclassical synthesis model." Do you agree? Make sure to touch upon the following in your discussion:

- How different agents interact to "solve the model"?
- The propagation mechanisms.
- Impact of economic shocks on inflation.

- d. The link between the labor market and inflation.
- e. The impact of business cycles on unemployment.

6. Consider a permanent increase in unemployment benefits. Explain the impact on the rate of unemployment according to the job-search and collective bargaining models. Make sure to lay out the theoretical foundations of each model explicitly.