



STUDIENZENTRUM GERZENSEE
STIFTUNG DER SCHWEIZERISCHEN NATIONALBANK

Swiss Program for Beginning Doctoral Students in Economics 1998

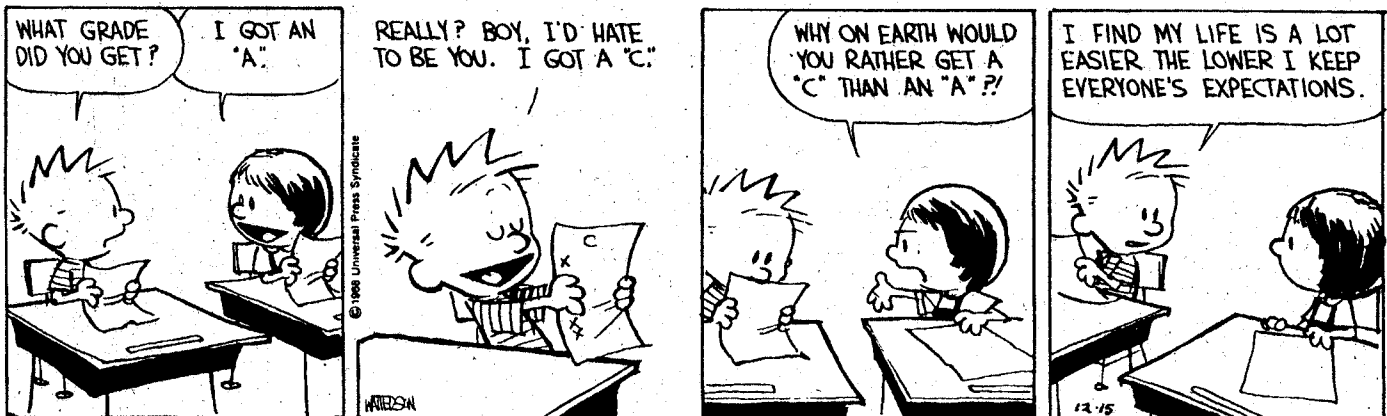
Final Exam in Macroeconomics

Tuesday, March 9, 1999, 08.30 - 11.30

1. You are allowed to use all material that you want (lecture notes, books, etc.) with the exception of PC's.
2. Please **do not** mention your name on top of the pages, but use your identification number from the enclosed list. The reason is that the exams will be graded anonymously.
3. Please read the whole question carefully before answering each subquestion shortly.
4. Good luck!

ID-Number: _____

CALVIN AND HOBBS



Studienzentrum Gerzensee
Macroeconomics Doctoral Course 1998
Final Examination

There are five questions on this examination, which are worth 20 points each. You have three hours to complete the examination. Please budget your time carefully and write legibly.

- (1) *Intertemporal Models of the Current Account.* Consider a 2-period model of a Small Open Economy where individuals value consumption in the 2 periods, denoted c_1 and c_2 , and where production in the 2 periods, y_1 and y_2 , requires capital alone.
- (a) Draw the autarky equilibrium in a graph where c_1, y_1 are on the horizontal axis and c_2, y_2 are on the vertical axis.
 - (b) Suppose that the autarky interest rate is below the world interest rate. Show on the graph what happens if the small country opens itself to trade in financial assets with the rest of the world. Specifically, show what happens to consumption c_1 and c_2 , saving, investment, and the current account in period 1.
 - (c) Now consider a 2-country world in which the home country has a low autarky interest rate and the foreign country has a high autarky interest rate. Suppose these two countries are allowed to borrow and lend from each other. Use the Metzler diagram to illustrate the world equilibrium and the determination of the world interest rate. Describe what happens to saving, investment, and the current account in each country.
 - (d) Use the Metzler diagram to analyze the effects of an anticipated future decline in productivity in the foreign country. That is: describe what happens to saving, investment, and the current account in each country. Characterize the form of the small country's optimal demand for capital.

- (2) *Expectations and Exchange Rate Dynamics*. This question concerns the Dornbusch model.
- (a) Write down the key elements of the model. What “stylized facts” was this model designed to explain?
 - (b) Describe the two alternative ways for clearing the goods market in the presence of sticky prices that are described by Dornbusch in this model.
 - (c) Draw the graph that illustrates the equilibrium in this model; describe each of the elements on this diagram and discuss possible transition paths for an economy not at the long run equilibrium.
 - (d) Use the diagram to illustrate the effects of a monetary expansion and show how the increase in money can lead to exchange rate ‘overshooting.’ Carefully describe the economic forces that lead to the overshooting phenomenon.
 - (e) Dornbusch describes a variant of his model in which the exchange rate does not overshoot. Describe the essential elements of the model without overshooting, and discuss the main economic forces that mean that overshooting does not occur.

(3) *Government spending in an open economy:*

- (a) Discuss the effects of government spending shocks in a world economy in which a real bond is the only traded asset. Specifically, describe the effects of G shocks on the trade balance, the current account, and the interest rate. Describe how these effects change with the persistence of the shock.
- (b) Re-do part (a) considering changes in the distortionary tax rate on output. Describe in detail the economic reasons why a tax shock that lasts for only 1 period has effects that are qualitatively different from a permanent tax shock.

- (4) *Sticky prices and disinflation*: The Calvo model of sticky prices implies that there is a “Phillips curve” of the form:

$$\pi_t = \beta E_t \pi_{t+1} + \varphi(y_t - \bar{y}_t)$$

where π_t is the inflation rate at date t , $E_t \pi_{t+1}$ is the expected future inflation rate, $(y_t - \bar{y}_t)$ is the gap between current output and the level that would prevail with imperfect competition but flexible prices and φ is a parameter.

- (a) Briefly describe how this relationship derives from sticky prices. Assuming that β is effectively unity, demonstrate that this model implies that there is no cost of an unexpected and permanent disinflation.
- (b) Suppose that the inflation rate is initially constant at a high level, m , for a long time so that actual and expected inflation are equal at that level. Suppose further that at date $t = 0$ the monetary authority announces and begins a gradual deflation program, which is described by the following:

$$\begin{aligned} \pi_t &= m - \left(\frac{m}{T}\right)t \text{ for } t = 0, 1, \dots, T \\ \pi_t &= 0 \text{ for } t > T \end{aligned}$$

If this deflation is fully credible, then what are the implications for the path of output?

- (c) Alternatively, suppose that the plan is imperfectly credible, in the following manner. At each date, if the inflation plan is continued in the current period, then inflation will be generated according to the above equation. However, with a probability α then the inflation plan will be stopped and inflation will return to m forever. Finally, if the inflation plan is successfully completed so that $\pi_t = 0$ at date $t = T$, then inflation will stay forever at 0. What will be the output dynamics under a successful plan, i.e., one that actually succeeds in lowering inflation to zero?
- (d) If the monetary authority wanted to make $y_t - \bar{y}_t = 0$ for all time, what monetary policy should it choose? How is this related to other results on optimal monetary policy.
- (e) Suppose, as in Clarida et al., that the inflation specification is modified to $\pi_t = \beta E_t \pi_{t+1} + \varphi(y_t - \bar{y}_t) + v_t$, where v_t is a “price shock” with a first order autoregressive form $v_t = \rho v_{t-1} + e_t$ with e_t being white noise. How does this price shock change the form of the monetary policy which makes $(y_t - \bar{y}_t) = 0$?

- (5) *Linear difference systems under rational expectations.* Consider a small macro model which takes the form,

$$PC : \pi_t = \beta E_t \pi_{t+1} + \varphi(y_t - \bar{y}_t)$$

$$F : R_t = r_t + E_t \pi_{t+1}$$

$$IS : r_t = -s(y_t - \bar{y}_t)$$

$$MP : R_t = \gamma E_t \pi_{t+1} + x_t$$

where the four specifications are as follows: the Phillips Curve discussed in the prior question is PC, the Fisher equation is F, the investment-savings equilibrium condition is IS and MP is a monetary policy rule.

- (a) Briefly discuss the economic elements of this model. How does it differ from the small “optimizing IS-LM model” which was used by Clarida et al. to discuss monetary policy issues?
- (b) Write the model as in first order form, $AE_t Y_{t+1} = BY_t + Cx_t$, where $Y_t = [\pi_t \ R_t \ r_t \ y_t]'$. What is the vector x_t ? What are the matrices A, B, C ?
- (c) Is the matrix A singular?
- (d) How would you determine whether the model had a unique stable rational expectations equilibrium? What literature would suggest that there might not be a unique stable RE equilibrium?