SIMON FRASER UNIVERSITY
Department of Economics

Econ 305
Intermediate Macroeconomic Theory

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PROBLEM SET 4
(Solutions)

1. China currently has a fixed exchange rate against the U.S. dollar. Many people argue that it should instead allow its exchange rate to float, and be determined by market forces, as in the U.S. and Canada. Using the Mundell-Fleming model, describe under what conditions China's economy would be more stable under a fixed exchange rate, and under what conditions its economy would be more stable under a flexible exchange rate. Use graphs to illustrate your answers.

   According to the Mundell-Fleming model, whether China's economy would be more stable under fixed or flexible exchange rates depends on which kind of shocks are more important in China. If most shocks are to the goods market (i.e, IS shocks) then output in China would be more stable under flexible exchange rates. In this case, exchange rate changes act as a 'shock absorber', i.e., they depreciate (and increase NX) in response to adverse shocks, while appreciating (and decreasing NX) in response to favorable shocks. However, if most shocks are in the (domestic) financial markets (LM shocks), then output in China would be more stable with fixed exchange rates. With fixed exchange rates, shocks to the LM curve are automatically offset though foreign exchange market intervention, since the Central Bank must intervene so as to keep the domestic interest rate equal to the foreign interest rate. See Lecture Slides 18 (pages 9-10) or Lecture Slides 18-Extended Version (pages 19-20) for the graphs.

2. Consider the following modification of the Diamond-Dybvig model discussed in class and in Chapter 15. There are three periods: 0, 1, and 2. The economy consists of a large number, N, of consumers, each endowed with one unit of a good in period 0. This good can be used as an input in production, but the production process is 'illiquid' in the following sense: If one unit is invested in period 0 then $1+r$ units of the good are produced in period 2. In class we assumed that if the production process is interrupted in period 1, then 1 unit is produced in period 1, and nothing more is produced in period 2. Now assume instead that the illiquid project cannot be interrupted, in the sense that if you do interrupt it, you get back nothing in period 1. However, assume that now that consumers can invest in a 1-period liquid asset that returns 1 unit of goods next period for each unit invested this period.

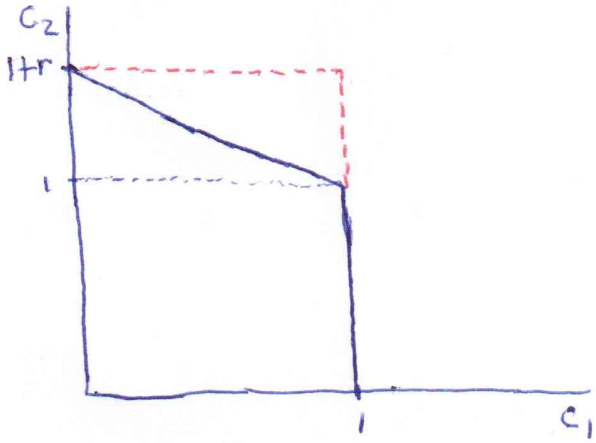
   As before, consumers have random needs for cash. In particular, with probability t each consumer may need to consume in period 1. With probability $(1-t)$ a consumer is patient, and will only need to consume in period 2. Initially, in period 0, when investment decisions are made, consumers do not know which type they will be. They do not discover this until period 1. Remember that before, when the project could be interrupted, it was a dominant strategy to invest everything in period 0, and to then interrupt the project in period 1 if you needed (or wanted) cash in period 1. Now the consumer's decision is not so clear, as he may not want to invest everything in the illiquid project, since he can't get his money back. Instead he may choose to put some in the liquid project.

   (a) Suppose there is no banking system. Graph the consumer's lifetime budget constraint. Compare it to the budget constraint that applies when consumers can interrupt the project. Illustrate the optimum for an early consumer and a late consumer.

When the project cannot be interrupted, households have a difficult decision to make in period 0. If they invest everything in the project now, they'll get nothing in period 1 if it turns out they are an early type. However, when there is an alternative liquid asset that pays off 1-for-1 no matter what, they can hedge their liquidity risk by putting some of their initial wealth into the liquid asset. Let x be the share of initial wealth invested in the illiquid project, so that $1-x$ is the share invested in the liquid asset. If this person turns out to be an early type, she will therefore consume $c_1 = 1-x$. If she instead turns out to be a late type, then $c_2 = (1+r)x + (1-x)$. (Since she can just reinvest in the liquid asset). Combining, we get the following intertemporal budget constraint,

$$c_2 = 1 + r(1 - c_1)$$

which we can graph as follows



For comparison purposes, the dotted red line plots the original budget constraint, when the project could be interrupted. Notice that the household can no longer get the combination $c_2 = 1 + r$ and $c_1 = 1$, since if it wants to get more than 1 in period 2 it must commit some funds to the illiquid project, which means c_1 will be less than 1, since the project cannot be interrupted. Clearly, households are now worse off, since the new budget constraint lies entirely within the old one.

(b) Now suppose there is a banking system. Illustrate the bank's intertemporal budget constraint. Describe the optimal deposit contract. Are consumers better off with a banking system?

The key point here is that as long as the bank knows t, and as long as N is large enough (so that the law of large numbers holds), the bank pretty much knows (i.e., with very high probability) how many people will show up at date 1. It does not have to resort to the liquid asset, since it can invest just the right amount in the illiquid project. So its budget constraint remains the same as before, and so does the optimal contract. (See the book or the notes for the graph).

(c) Is this economy susceptible to bank runs? Why or why not?

Obviously, this economy is even more susceptible to bank runs, since Type 2's now realize there will be even less to go around in period 1 if in fact there is a run, since the illiquid project now yields nothing.

3. Consider the job search model discussed in class and in Chapter 16. In this model, suppose a new website is created that facilitates the matching between workers and firms, so that p, the probability of receiving a job offer, increases. Describe what happens to the reservation wage. Describe what happens to the equilibrium unemployment rate. Use the appropriate graphs to illustrate your answer.

This is straight from the book. See Figure 16.15 (page 352).