Econ 434 Professor Ickes

Fall 2006

Midterm Exam II: Answer Sheet

1. *(25%) Consider the simple open-economy model of the gold standard. Suppose that the economy starts out in equilibrium with given gold stock, G_0. What happens to the price level and the stock of gold, in the short run and the long run, if (be sure to explain your answer):*

   (a) *Gold is discovered in a far-away country.*

   brief answer This will raise income elsewhere, and hence our exports. So the trade balance will be positive and we accumulate gold. So the gold stock will rise and the price level will as well. Consider figure 1. We start at $\left(\frac{P_G}{P}\right)_0$. The discoveries of gold raise foreign income so there is trade surplus at the old relative price of gold. The gold stock rises and the relative price of gold fall to$\left(\frac{P_G}{P}\right)_1$.

   (b) *The reserve ratio, λ, is cut.*

   brief answer A fall in λ means that less monetary gold is demanded at any price level. This means that the relative price of gold will fall (our price level will rise). We become less competitive, so there will be a trade deficit, the gold stock will decrease and we eventually return to the original relative price of gold (original price level) but with a lower gold stock. The fact that we need less gold means some leaves the country. This is exactly the case of an increase in money demand reversed.

   (c) *Foreign and domestic income rise proportionately.*

   brief answer The fact that foreign and domestic income rise proportionately implies (in our simple model) that net exports are unaffected (since only the ratio matters). But the rise in domestic income also means that the demand for gold rises. So that will cause the relative price of gold to increase, causing us to become more competitive, causing a trade surplus and a gold inflow, which leads the price level to return to its original level but with a higher gold stock.

   brief answer two The previous answer assumes that the foreign country is not on the gold standard. So only the price level in the domestic country falls. If the other country is on the gold standard then the same effect happens there. Money demand increases and the price level in the foreign country falls. If the reserve ratios are the same in the two countries, and if they are of the same size then there should be no change in the terms of trade, so no gold inflow. So the price level just falls everywhere. This is the more correct answer, but the easier one is okay for the exam, as long as you are clear on your assumptions.

   (d) *The US government approves free coinage of silver at a legal rate of* 16 *ounces of silver to* 1 *ounce of gold, while the market rate for gold in terms of silver is* 32 *to* 1.

   brief answer William Jennings Bryan's preferred case. This increases the stock of "monetary gold" considerable. The money supply is given by $M = \lambda[P^G(G + \frac{P^s}{P^G}S)]$,

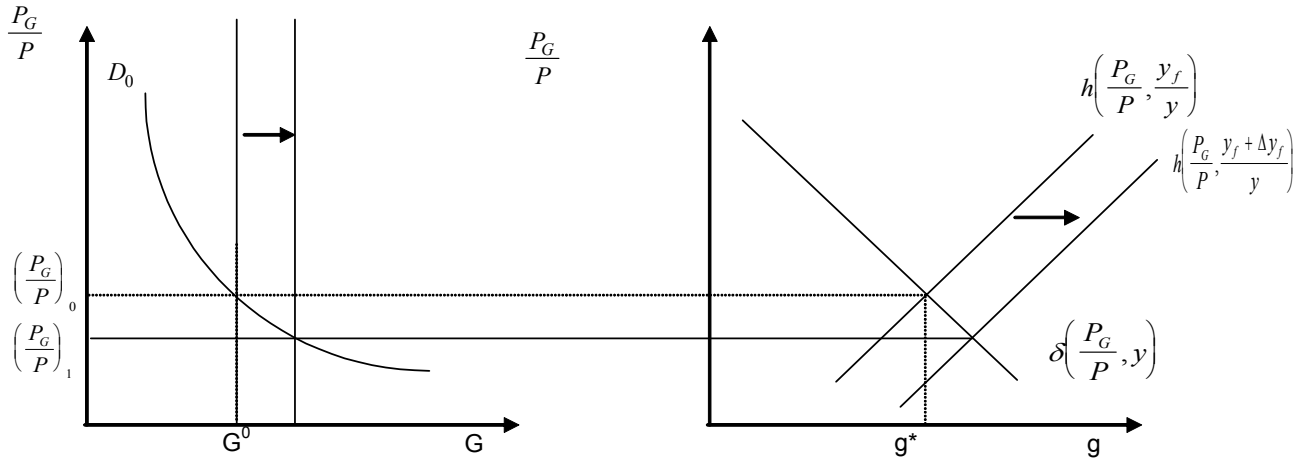

Figure 1:

and at a ratio of $16-1$ a lot of silver will be presented to the mint. Sell an ounce of gold for silver and you get 32 ounces of silver which gives you two ounces worth of gold coins at the mint. So lots of silver will be delivered to the mint. The stock of "monetary gold" will rise and the relative price of gold will fall (our price level will rise a lot). This will cause a trade deficit and a gold outflow (indeed, we should expect all gold to leave the country, since the mint is now undervaluing gold domestically). If the US is small we eventually return to the initial equilibrium, but our composition of specie is heavily silver. If the US is very large, so that the coinage of silver raises the world specie stock all prices would be somewhat higher in the new equilibrium..

2. *(20%) "If capital markets are fully developed and integrated across countries then real interest differentials must be eliminated. This means that it is easy for the US to borrow to finance its current account deficits. It also means that no adjustment of the real exchange rate is needed to restore equilibrium." Do you agree or disagree? Explain carefully.*

   brief anwer Capital markets being integrated reduces impediments to flows of capital. But real interest differentials are only eliminated if purchasing power parity holds. If not, then the real exchange rate can still change because the composition of output between traded and non-traded goods can change. It is true that if capital markets are more integrated we can borrow from the whole world to finance our deficits. But to pay them back we still need to produce more traded goods. If PPP held the statement would be true. When PPP does not hold it is false. What matters for the real exchange rate is good market integration, not capital market integration.

3. *(30%) Suppose one tests uncovered interest parity by estimating a regression such as*

$$e_{t+1} - e_t = \alpha + \beta(F_t - e_t) + \gamma X_t + \varepsilon_t \tag{1}$$

where e_t is the spot exchange rate at time t, F_t is the forward exchange rate at t, X_t is any other potentially useful information known at time t, and ε_t is a random error.

(a) *If agents form their expectations rationally and uncovered interest parity holds, what would we expect to find in the data? That is, what values should we expect to find for α, β, and γ? Explain.*

brief answer If UICP holds then forward rates should be unbiased predictor of future spot rates. So we should find $\alpha = \gamma = 0$, and $\beta = 1$. Rational expectations means that we may make mistakes but they should be unbiased. All useful past information goes into determination of F. Covered interest parity implies that the forward rate is only higher than the spot rate when domestic interest rates exceed foreign interest rates. Uncovered interest parity implies that expected future spot rates exceed the current sport rate only when domestic interest rates exceed foreign interest rates. If i^* rises, for example, both F_t and the expected value of e_{t+1} should rise by the same amount. So $\beta = 1$, and nothing else in equation (1) should matter.

(b) *Do empirical tests confirm our predictions (regarding α, β, γ)? Explain.*

brief answer Typically not. They typically find that $\gamma, \alpha \neq 0$, and most importantly that $\beta < 1$ and often $\beta < 0$. This is the forward discount puzzle. The forward rates under-predicts changes in the spot rate, and if $\beta < 0$ it gets the sign of the change wrong!

(c) *Could the typical estimated values of β be explained by a risk premium? How?*

brief answer Yes. If agents are risk averse then arbitrage would lead to $1+i = \frac{\widehat{e}_{t+1}}{e_t}(1+i*)+\rho_t$, where ρ_t is the risk premium. Thus we have $f_t = \delta_t + \rho_t$. Hence, if $\rho_t > 0$ the forward rate could over-predict changes in the spot rate. Indeed, if ρ is large enough $\beta < 0$ is possible. The basic idea is that people are unwilling to bear currency risk, they demand a premium to do so. Hence, they will not arbitrage away all interest differential. But covered transactions do not bear currency risk.

(d) *Suppose there is no risk premium. Can we make money using the estimates of equation (1)? Explain what we should do in order to make money.*

brief answer If there is no risk premium, then there is some inefficiency so we should be able to make money. Suppose $i > i^*$. If UICP holds, then the higher domestic yields just compensates for future capital losses holding dollars. But suppose instead that $\beta < 0$ and there is no risk premium. Then if we borrow in yen at i^* and earn dollars a i not only do we earn a positive interest differential, but the yen is supposed to depreciate against the dollar! So we just borrow in the low interest rate country and invest in the high interest rate country. Again, note that if interest parity held there would be no gain here. But with $\beta < 0$ there is no currency risk being offset by the interest differential.

4. *(25%) Consider a small open economy with a fixed exchange rate. Suppose that the government (the central bank here is independent of the ministry of finance) runs a one-time deficit that it finances by borrowing (issuing debt) and that the central bank is obligated to purchase this debt. If the fixed exchange rate is to be maintained, what additional action must the central bank take, if any? Explain.*

brief answer The central bank is purchasing government debt, so the monetary base, and thus the money supply is rising. This would put increase the supply of dollars relative to foreign exchange. To maintain the value of the exchange rate the central bank should sell foreign exchange for dollars to offset the increase in the monetary base. When the government sold the CB the bonds, the government received money, so the money stock would rise, to prevent this the CB must do something to offset this change. If the government did nothing interest rates would fall below foreign rates, with a fixed exchange rate this would cause capital to flow out of the country and put pressure on the exchange rate.

(a) *Now suppose that the government's fiscal policy implies a deficit each period. That is, the debt will grow at some rate $\mu > 0$ each period, presumably forever. Can the central bank permanently keep its obligation and maintain the current fixed exchange rate? Explain.*

brief answer The government must sell foreign exchange each period to prevent the monetary base from expanding. But it cannot do this forever as its supplies of foreign exchange are finite.

(b) *If investors are rational and the central bank keeps its obligation to purchase government debt what will happen to the exchange rate?*

brief answer Rational investors realize the central bank will eventually run out of reserves and they will want to get out of the domestic currency before reserves are exhausted.

(c) *Is it possible to determine when the timing of the change in the exchange rate regime? Explain.*

brief answer Yes. We know once the central bank stops pegging, the exchange rate will appreciate each period (at the rate of monetary growth in a simple PPP type model, but for sure it will keep appreciating as the CB is expanding the money supply each period). If investors wait too long to exit the currency then the exchange rate will jump when attacked, meaning a capital gain has been lost by waiting too long. In figure 2 reserves run out at time $\widehat{t}$, but if investors wait till then they absorb a capital loss when the dollar collapses. So they will attack before that. So the attack should occur on the first date when collapse of the fixed rate means no jump in the rate; date t_c in the figure. If they attack too soon the exchange rate would depreciate and then they would get a capital loss by selling dollars too soon. It is interesting to note that this sharp result occurs because the government is mechanistic and the private sector is informed and smart. In a more realistic model the public sector would also act strategically, hoping to influence the beliefs of the private sector. But that would make a harder problem for an exam!

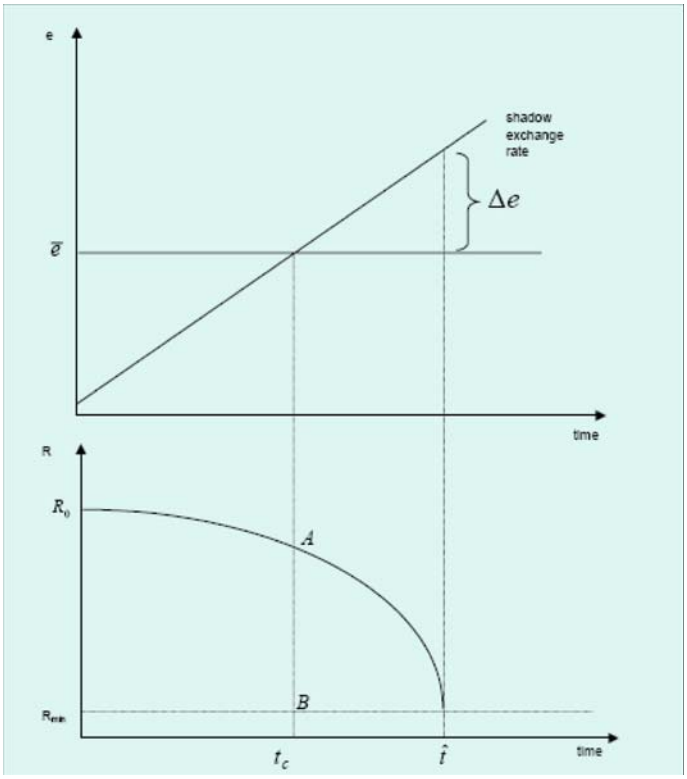

Figure 2: