

**Brief solution key to  
International Macro Field Exam Questions 3-5**

**Question 3: Interest Rate Parity Conditions**

- a) uncovered interest rate parity:

$$i_{\$} = i_{\text{euro}} + E(e_{\$/\text{euro}} - e_{\$/\text{euro}})$$

covered interest rate parity:

$$i_{\$} = i_{\text{euro}} + (f_{\$/\text{euro}} - e_{\$/\text{euro}})$$

real interest rate parity:

$$r_{\$} = r_{\text{euro}} + E(q_{\$/\text{euro},t+1} - q_{\$/\text{euro},t})$$

foreign exchange market efficiency condition:

$$f_{\$/\text{euro}} = Ee_{\$/\text{euro}}$$

Where:  $i$  is the nominal interest rate,  $e$  is the spot exchange rate,  $f$  is the forward rate,  $r$  is the ex ante real interest rate,  $q$  is the real exchange rate. These are linear approximations.

- b) UIP: regressions of change in  $e$  on the forward rate or on the interest differential:

$$(e_{t+1} - e_t) = a_0 + a_1(i_t - i_t^*) + \varepsilon_t$$

Results show  $a_1$  does not equal one, and usually is less than zero. This says that when the home interest rate is high, this predicts currency appreciation in the future. This indicates the omitted risk premium is time varying. Examples are Backus et al (JOF 1993) and McCallum (JME 1994)

ii) GMM tests of the nonlinear Euler condition above. Reject in some cases but not most. Results are mixed. Mark (JME 1985) generally cannot reject the model, suggesting the risk premium is there and is time varying, but behaves generally as theory suggests it should. However, subsequent papers have tended to reject the theory more often: Hodrick (1989 JME), Backus et al (JOF 1993)

iii) VAR studies. Show when monetary shocks raise the domestic interest rate, there is delayed overshooting. This coincides with the regression studies above. This shows that the time-varying risk premium moves systematically in relation to the money supply. (A risk premium conditional on monetary policy.)

Covered irp: This can be tested by running the regression in (i) above, but replace expected future spot rate with forward rate. This holds very well in the data.

Market efficiency: This is tested in the same way as (i) above, but replace the interest rate differential with forward premium. Many of the papers discussed in (i) above do this test as well. Given the success of covered irp, the tests of uip and market efficiency give the same result and are rejected.

Real interest rate parity: As discussed in chapter 6 (pp. 622-624) of the Obstfeld-Rogoff 1996 text, this was tested by Meese and Rogoff (1988 JOF), which was unable to support the condition. Clearly, since the condition requires both UIP and relative PPP, and both of these fail, it is not surprising that real irp fails as well. This is also discussed in Engel (1996 JEF).

#### **Question 4: Fixed. V. Flexible Exchange Rates**

An answer should at least contain the following:

Helpman (1981): In a model without rigidities, there is no difference between fixed or flexible exchange rate regimes.

#### **Obstfeld-Rogoff (1998)**:

Exchange rate uncertainty induces monopolistically competitive firms to set higher prices and restrict output. This is to hedge against unexpected changes in the exchange rate from generating unexpected changes in foreign demand for their good. But this has the effect of lowering steady state consumption, which lowers welfare. So this paper offers a reason why fixed exchange rates might be better.

The tendency for firms to hedge depends on how large the country is. For a small country, foreign demand is a larger share of total revenue, so there will be more hedging. Flexible exchange rates hurt more. The effects on welfare also depend on the coefficient of relative risk aversion: a greater risk aversion means exchange rate variance has a larger effect to lower welfare.

#### **Bacchetta and van Wincoop (2000)**

This paper highlights how the effects on welfare depend on substitutability between consumption and leisure. Consumption and leisure are more negatively correlated under a fixed exchange rate regime, because a rise in home money supply makes consumption and leisure move in opposite directions, while a shock in foreign money supply alone only moves leisure. So if consumption and leisure are substitutes, it is a good thing for them to move in opposite directions, and this makes a fixed regime desirable. And if they are complements, it is a bad thing, so this makes a flexible exchange rate regime more desirable. So if the elasticity of substitution between consumption and leisure is high, this tends to make a fixed exchange rate more desirable.

Under this condition (substitutability between consumption and leisure), it is also true that fixed exchange rates promote trade. But note that this is not true if consumption and leisure are complements.

In addition, the sheer fact that leisure is variable is a bad thing, and this tends to be higher under a fixed exchange rate regime because home and foreign money shocks are moving together. This tends to make flexible exchange rates more desirable, if the risk aversion is large.

Overall, a fixed exchange rate will be desirable only if the elasticity of substitution between consumption and leisure is sufficiently high to overcome the effect of increased leisure variability.

#### **Devereux and Engel (2000)**

This paper shows that the assumption of local currency pricing (LCP) tends to make fixed exchange rates more attractive. Under LCP, exchange rate movements do not serve a beneficial

function of helping the economy adjust to real shocks. So fixed exchange rates tend to be more desirable under the LCP assumption.

The paper also shows it is more desirable to fix the exchange rate to another currency if the other country tends to have small monetary shocks.

b) Mundell:

Mundell argued that fixed exchange rates have the benefit of promoting trade. But Bacchetta and van Wincoop (2000) show this is not true if consumption and leisure are complements.

Mundell argued that the cost of a common currency/fixed exchange rate regime was the loss of independent monetary policy and exchange rate flexibility as a way of adjusting to shocks. This is a big cost if shocks are asymmetric between countries, or if there is little labor mobility or fiscal federalism to help offset the effects of asymmetric business cycles.

But Devereux and Engel (2000) showed that under LCP, exchange rates do not help much in facilitating adjustment to real shocks.

The recent papers also differ in that movements in output are not the criterion for deciding on a regime, but movements in welfare. As Bacchetta and van Wincoop showed, movements in output may be less or more severe, depending on how leisure and consumption interact.

## **5. International integration**

Although there is a common perception of extensive economic integration, there are many ways in which national economies remain surprisingly segmented from each other. A good essay would include the following points:

### Evidence of segmentation between national goods markets :

- 1) The prices of goods can differ greatly between national goods markets. Consider the 3 Engel papers showing failures in the law of one price: Engel (1993), Engel and Rogers (1996), Engel (1999). (See lecture 7, part 1, sections b-e for discussion of these papers.)
- 2) International business cycles also offer empirical evidence: output levels across countries are correlated but the average correlation is only about 0.5. The correlation is even lower for consumption levels. This is documented by Backus, Kehoe and Kydland (1992).
- 3) As documented in Obstfeld and Rogoff (2000), there is significant home bias in consumption bundles. This may reflect a cost to imported goods from abroad.

### Evidence of limited integration in international capital markets:

- 1) Feldstein and Horioka (1980) found in a cross-sectional study that saving and investment tended to be highly correlated within countries. Subsequent studies have confirmed the finding in time series data. This could indicate that countries were forced to finance investment out of domestic saving because of an inability to borrow in the world capital market. However, there are alternative explanations for the empirical finding. Investment might be driven by global technology shocks, which would drive up the world interest rate and prevent borrowing to finance investment. Another explanation is that the technology shocks driving investment are less than permanent, so consumption smoothing would imply a rise in saving.
- b) Portfolio diversification puzzle: Poterba (1991) and Tesar and Werner (1995) have documented that equity portfolios tend to be heavily biased toward home assets, whereas a simple model would imply agents should hold a share of the world portfolio. In fact, Baxter

and Jermann (1997) showed that to diversify away from labor income risk, it may be optimal to hold a portfolio short in domestic assets. This probably does not indicate a higher cost to buying foreign assets, since the trade volume in foreign equities is high, even if the net holding is not. One alternative explanation is that shares in foreign nontraded goods that pay off in terms of traded goods are not useful for hedging against domestic nontraded goods consumption risk. To explain the magnitude of home bias in assets, one must assume a low degree of substitutability across goods. A related explanation is that costs of trading goods biases consumption toward home goods, so that home assets are a better hedge against consumption risk.

- c) Empirical tests nearly universally reject the relationship between country's interest rates implied by uncovered interest rate parity. Because this parity requires people be willing to hold foreign assets rather than home assets if the expected return is higher, the failure of the condition could indicate a lack of integration in these asset markets. An alternative explanation is that there is a time-varying risk premium that induces fluctuations in the interest rate spread and makes uncovered interest parity fail.

It is worth noting, however, that many of the above features can be explained by a lack of integration in the goods market rather than the asset market. Obstfeld and Rogoff (2000) show how trading costs in international shipments can replicate both point (a) and (b) above.