

**Brigham Young University Department of Economics**  
**Economics 459 - International Monetary Theory**  
**Dr. Phillips (section 1) Spring Term 2009**  
**Thursday & Friday, May 21 – 22, 2009**

**Midterm Exam key**

Your International Monetary Theory professor has a former student who is now the Vice Minister for Foreign Financial Relations at the Ministry of Finance in the small, but proud country of Beluga. He is looking to hire several interns and would like to support his alma mater, Brigham Young University. He has asked your professor to administer a test to all potential applicants. He has submitted 5 questions. Answer each one in the space provided. Remember the currency in Beluga is the bugle.

1. “I need to understand some unfamiliar terms I ran across while reading a news magazine. Please write me some one-sentence definitions of the following:”

triangular arbitrage –

**act of trading a currency for a 2<sup>nd</sup> currency, and then trading that for a 3<sup>rd</sup>, and finally trading the 3<sup>rd</sup> for the 1<sup>st</sup> and making a profit in the process.**

forward premium –

**the percent by which the current forward exchange rate exceeds the current spot exchange rate**

real exchange rate –

**the value of a foreign basket of goods in terms of domestic baskets of goods**

absolute risk premium –

**the difference between the expected return on an asset and the return on a certain or safe asset (i.e. no uncertainty)**

uncovered interest rate parity –

**the notion that the gross domestic interest rate (1+i) should be equal to the expected return on an equivalently risky foreign asset when the investor converts his foreign earnings back into domestic currency at the future spot rate**

2. “Here are the figures from this morning’s edition of the Belugan Better Business Bureau Report with spot & forward exchange rates:

Country	Currency	spot rate	30-day forward rate (APR)
USA	dollar	3245 bugles/\$	3298 bugles/\$
Zalchistan	zotney	19.21 bugles/zotney	18.91 bugles/zotney
Europe	euro	4432 bugles/€	4512 bugles/€

“The Ministry of Finance has the following deposits denominated in various currencies at a very safe bank in Switzerland. We do not plan on moving any of these funds but would like to know how much interest we can expect to earn on each of these accounts over the next 30-days”

Currency	Current Balance	30-day interest rate (APR)	Interest to be earned over 30-days
US dollars:	\$400,000	<b>i-21.46%</b>	\$
Euro:	€550,000	<b>i-23.95%</b>	€
Zalchistani:	2,000,000 zotneys	<b>i+17.21%</b>	zotneys

“Carefully and legibly show your work below”

We need to solve for the interest rates in the foreign countries. Unfortunately, we do not have the domestic interest rates and will have to make our own assumption about what it is. Given  $i-i^*=\phi$ , we can get  $i^*$  by using  $i^* = i - \phi$ . We can calculate the value of  $\phi$  using the information from above. For this example let’s assume  $i=25\%$ , but you may have assumed some other value. Note once we have  $i^*$  we still need to convert it from an APR return to a 30-day return. This is approximated by dividing by 12. The exact formula is  $i_{30\text{-day}} = (1+i_{\text{APR}})^{(1/12)} - 1$

US dollars

The annualized forward premium is  $(3298/3245)^{12} - 1 = 21.46\%$

Hence,  $i^* = 25\% - 21.46\% = 3.54\%$

So, earnings will be approximately  $\$400,000 (.0345/12) = \$1180$

Or exactly  $\$400,000 (.0029) = \$1161$

Euro

The annualized forward premium is  $(4512/4432)^{12} - 1 = 23.95\%$

Hence,  $i^* = 25\% - 23.95\% = 1.05\%$

So, earnings will be approximately  $\text{€}550,000 (.0105/12) = \text{€}483$

Or exactly  $\text{€}550,000 (.0009) = \text{€}481$

Zalchistani zotneys

The annualized forward premium is  $(18.91/19.21)^{12} - 1 = -17.21\%$

Hence,  $i^* = 25\% - (-17.21\%) = 42.21\%$

So, earnings will be approximately  $\text{Z } 2,000,000 (.4221/12) = \text{Z } 70,353$

Or exactly  $\text{Z } 2,000,000 (.0298) = \text{Z } 59,561$

Failure to assume a value for  $i$  -5pts

Wrong exponent in fp formula -5pts

3. “The President is having a summit next month with the High Chancellor of Zalchistan, a hated rival country. He would really like to show that things are better here in Beluga than they are in Zalchistan. Here are some figures. Calculate the value of real GDP per capita in both our countries using US dollars as the valuation currency. Should our president use this information at the summit? “Carefully and legibly show your work.”

2008 Belugan real GDP per capita (measured in 2004 bugles) – 75 million bugles

2008 Zalchistani real GDP per capita (measured in 2004 zotneys) – 4.2 million zotneys

2008 average exchange rates:

3012 Bugles per \$

20.33 Bugles per zotney

2008 Belugan CPI (2004 base year) – 123.0

2008 Zalchistani CPI (2004 base year) – 109.8

2004 real exchange rates (as reported in the Penn World Table)

Beluga – .765

Zalchistan – .455

**Everyone gets full credit for this question. I apologize for making it impossible to solve with the given information. I meant to report the 2008 US CPI which would've made it possible. Alternatively, you could've deflated everything back to 2004 currency units, but you don't have the 2004 exchange rates need to convert to 2004 dollars. I owe you doughnuts!**

4. “Recently we have been growing at roughly the same rate as our hated neighbor, Zalchistan. In addition, our money supplies have been growing at roughly the same rate. Due to the recent financial turmoil we believe that Zalchistan will go into a prolonged and steep recession, but here in Beluga due to our wise investment in the production of income inferior goods, we don’t expect our recession to be nearly as severe as theirs. Zalchistani goods are fair, but not perfect substitutes for our goods. Can you give me a prediction for the path of the bugle per zotney exchange rate? Be sure to explain your answer and provide reasoning from a well-accepted economic model. Diagrams or figures would help too.”

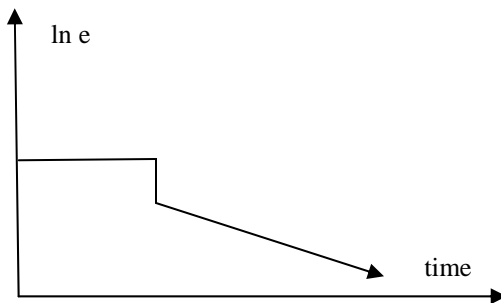
**We should use our long-run equilibrium approach to exchange rates.**

$$e = q \frac{M}{M^*} \Lambda \left( E\{\delta + g_M - g_Y - g_M^* + g_Y^* + \rho\}, \frac{Y^*}{Y} \right)$$

**In the past  $g_Y$  and  $g_Y^*$  have been the same value and  $Y^*/Y$  has been constant, meaning  $q$  has been constant and  $\delta$  (the % change in  $q$ ) has been zero. Also, in the past  $g_M$  and  $g_M^*$  have been the same and  $M/M^*$  has been constant. So up until the financial turmoil the exchange rate has been roughly constant.**

**Now, however, while both  $g_Y$  and  $g_Y^*$  are expected to fall in the future,  $g_Y^*$  is expected to fall more.  $Y^*/Y$  should follow a downward trend in the future.  $q$ , on the other hand, is negatively related to  $Y^*/Y$  and should follow an upward trend. Given the wording we will assume that the effect via  $q$  is smaller than the effect via  $Y^*/Y$ . Hence, we will also expect that while  $\delta$  is expected to be positive, the expected decrease  $-g_Y + g_Y^*$  is more negative than this. We thus expected  $i-i^*$  to jump down. The combined effect of  $q$  versus  $Y^*/Y$  via  $\Lambda$  will be a long downward trend.**

**Hence we predict in the long-run that it will take fewer and fewer bugles to buy a zotney. In the short-run the exchange rate will also drop suddenly.**



5. “Investors here in Beluga can choose to buy domestic assets, the safest being a Belugan Treasury Bill. Another safe investment would be to buy US Treasury Bills, but this requires buying dollars today on the spot market and selling dollars on the forward market for future delivery. I know that if Belugan and US T-bills have identical risk properties, the risk premium between a domestic investment and a covered foreign investment should be zero. However, the risk properties of these two types of T-bills are NOT identical. Recall the first-order conditions from the investment model in your International Monetary Theory class. Write down a general formula for the relative risk premium between these two strategies when the risk properties (i.e. variances and covariances) of the two T-bills are not identical.

**Recall a relative risk premium between D & C is:**

$$\mu_D - \mu_C = \gamma \text{Cov}\{r_D - r_C, \ln C\}$$

**Returns are defined by:**

$$r_D = i_h - \pi, \quad r_C = \phi + i_f - \pi$$

$$r_D - r_C = i_h - \phi - i_f$$

**So,**

$$\mu_D - \mu_C = \gamma \text{Cov}\{i_h - \phi - i_f, \ln C\}$$

$$= \gamma [\text{Cov}\{i_h, \ln C\} - \text{Cov}\{i_f, \ln C\}] \quad \text{Note } \phi \text{ is a constant and has a covariance of zero}$$

“Suppose that the Belugan T-bill is more risky than the US T-bill and that the covariance of these T-bills with all other random variables is zero. What can you say about the risk premium above under these conditions?”

**Letting the 1<sup>st</sup> asset in the portfolio be the domestic strategy and the 2<sup>nd</sup> be the covered foreign one**

$$\ln C = \ln C_0 + w_1 r_D + w_2 r_C + \sum_{i=3}^I w_i r_i$$

$$\ln C = \ln C_0 + w_1 (i_h - \pi) + w_2 (\phi + i_f - \pi) + \sum_{i=3}^I w_i r_i$$

$$\ln C = \ln C_0 + w_1 i_h + w_2 (\phi + i_f) - (w_1 + w_2) \pi + \sum_{i=3}^I w_i r_i$$

$$\text{Cov}\{i_h, \ln C\} + w_1 \sigma_h^2 + w_2 \sigma_{hf} - (w_1 + w_2) \sigma_{h\pi} + \sum_{i=3}^I w_i \sigma_{hi}$$

$$\text{Cov}\{i_f, \ln C\} + w_1 \sigma_{hf} + w_2 \sigma_f^2 - (w_1 + w_2) \sigma_{f\pi} + \sum_{i=3}^I w_i \sigma_{fi}$$

**With zero covariances all the terms disappear except the variances**

$$\mu_D - \mu_C = \gamma [w_1 \sigma_h^2 - w_2 \sigma_f^2]$$

**It is only zero under very special circumstances and generally speaking is not zero.**

**Unless we know the relative size of  $w_1$  and  $w_2$  we cannot unambiguously sign the risk premium.**