Question 1. True/False: International Money Markets (40 points)

FOR THESE QUESTIONS, YOU MAY EITHER USE IS-LM ANALYSIS OR SIMPLY PARTIAL (SINGLE MARKET) ANALYSIS PLUS THE INVESTMENT EQUILIBRIUM CONDITIONS.

i) From an initial covered investment equilibrium, an increase in the supply of currency in a country tends to reduce the domestic interest rate and so produce temporary capital outflows.

**TRUE:** When the supply of currency is increased, the excess currency supply is eliminated - for given real income - by a reduction in the rate of interest paid on alternative assets which increases the demand for real balances. The LM curve shifts to the right; a lower interest rate and higher equilibrium output level are required to simultaneously reequilibrate domestic asset and goods markets. (Lower interest rates reduce desired savings and raise desired investment, necessitating higher income to increase savings at any given interest rate). This lower interest rate produces incipient capital outflows for any economy operating in efficient international financial markets in which arbitrage can be costlessly undertaken. From an initial covered investment equilibrium in which the forward premium is equalized to the interest differential across two countries, \((F-e/e = i - i^*)\) the rate of return to domestic assets relative to foreign assets falls. International investors therefore arbitrage by borrowing in the domestic (cheaper) country and lending abroad until rates of return are equalized once more. i.e. capital outflows will result until interest rates and the exchange rate adjust to eliminate the return differential.

ii) From an initial uncovered investment equilibrium, a rise in government spending which tends to raise the domestic interest rate will produce temporary capital outflows.

**FALSE:** A rise in government spending reduces desired savings; government consumption of total resources available rises, while desired consumption falls (desired savings rise) by only a fraction - the marginal propensity to consume - of the rise in government spending to account for any anticipated future tax hikes. Thus the IS curve shifts to the right since a higher interest rate is required to equilibrate savings and investment - goods demanded and supplied - at any given income level. A higher interest rate and higher income level are required to simultaneously reequilibrate money and goods markets, since higher interest rates produce an excess supply of real money balances that is eliminated by higher transactions demand generated by higher income. From an initial uncovered investment equilibrium in which rates of return are equalized across countries by \(E(e(t+1)-e(t))/e(t) = i - i^*\), the return to domestic assets is now increased which produces capital inflows. International investors arbitrage away the return differential by borrowing abroad and lending in the domestic country. (NOTE: the economy's long-run equilibrium income level may also rise in this case since higher government spending tends to increase labour supply at any given real wage. This does not alter the answer to this question.)

iii) If a risk averse US investor believes that purchasing power parity holds between the US and Japan, then the expected real interest differential between the US and Japan will be irrelevant to her investment decision.

**FALSE:** If the US investor believes that PPP holds, then she believes that \(e = P/P^*\) implying...
that \( e = P - P^* \). Then \( E(e) = P - P^* \). A risk-averse investor cares about expected real returns and variability around these expected real returns. Thus she compares \( r = i - P \) and \( r^* = i^* + E(e(t+1) - e(t))/e(t) - P = i^* + E(e) - P \), which under PPP, \( = i^* - P^* \). She also accounts for the variance of ex post real returns which involves accounting for the covariance of \( P \) and \( P^* \) under PPP. However, it is clear that the expected real interest differential \( (i - P) - (i^* - P^*) \) is a critical decision variable for such an investor.

iv) If uncovered foreign investments raise the overall riskiness of a domestic investor's portfolio, then the forward rate will tend to be lower than the expected future spot rate.

**TRUE:** we know that CIRP typically holds in the data up to transactions costs and political risk factors so that to an approximation \((F-e)/e = i - i^*\). However, UIRP does not hold typically due to the presence of time-varying risk premia which mean that \( E(e) = i - i^* + R \) where \( R \) is a possibly time-varying risk premium. In other words, \( R > 0 \) implies investors are setting expected returns to less risky domestic assets lower than those to more risky uncovered foreign assets in equilibrium since they demand higher expected compensation for holding assets with higher expected return variability. The converse argument holds for \( R < 0 \). Then, \( (F(t) - e(t))/e(t) = E(e(t+1) - e(t))/e(t) - R \). If uncovered foreign investments raise the overall riskiness of an investor's portfolio, then \( R \) tends to be positive because investors tend to demand higher expected returns to such investments to compensate for their higher risk. Hence, the forward premium tends to be lower than the expected rate of currency depreciation, or \( F(t) = E(e(t+1)) - Re(t) \); the forward rate is lower than the expected future spot rate.

v) If the covariance of two countries' inflation rates is positive, then risk-averse investors will tend to set the forward rate above the expected future spot rate.

**FALSE:** If the covariance of two countries' inflation rates in positive, then holding both countries' assets in an international money market portfolio tends to raise the overall variance of that portfolio since the real returns to those two countries' assets tend to move together. (This, of course, is conditional on investors believing that some weak version of PPP holds - see above answer to question iii) - or using foreign inflation to proxy for other foreign country fundamentals when attempting to evaluate expected real returns and return variances.) Then risk-averse investors will typically demand a (positive) risk premium for holding multiple uncovered foreign assets which exhibit such positive inflation covariance with each other. Consequently, when comparing domestic to any such foreign asset returns in uncovered investment decisions, investors set \( i = i^* + E(e) - R \), \( R > 0 \). Since \( i = i^* + (F-e)/e \), then the forward rate of the domestic currency against the currency of such a country must be less than the expected future spot rate.

**Question 2. Exchange Rates and Output Determination. (60 points)**

# 1. (8 points)

\( Ms = 400 \)
\( i^* = 0.1 = i \) in equilibrium.
\( P = 1 \), fixed
\( Ld = 0.25Y - 4000(0.1) \)

Then, \( Ld = Ms/P = Ms = 400 \) implies that \( 400 = 0.25Y - 400 \) or \( 800 = 0.25Y \).
Hence \( Y = 3200 \).

When \( Ms = 450 \), the same calculation yields \( Y = 3400 \).
Hence, a monetary impulse raises short-run equilibrium output by 200.
# 2. (10 points)

**No long-run effect on income. Long-run real and nominal exchange rate appreciation. Short-run (transient) increase in output and interest rate.**

The imposition of a tariff raises the price of imports and, under the Marshall Lerner condition, therefore raises the trade balance, T, as domestic consumers substitute sufficiently strongly into domestic relative to foreign goods. The rebate of these tax revenues raises the level of autonomous demand, A. Hence aggregate demand for domestic goods rises, and the IS curve shifts to the right. This occurs because at any given interest rate, higher output must be supplied to meet the higher demand for goods to keep the goods market in equilibrium.

Both a higher equilibrium interest rate and output level is required for simultaneous domestic money market equilibrium and goods market equilibrium since higher output raises the demand for money while the supply of money is fixed. A higher interest rate chokes off some of the extra demand for money. Under flexible exchange rates and capital mobility, the higher domestic interest rate (return to bonds) produces incipient capital inflows until \( i = i^* \) once more. This adjustment is achieved by an appreciation of the domestic currency as international investors purchase domestic assets (lend to the domestic country) with domestic currency. \( e \) - the price of foreign exchange - falls, which reduces \( q = e p^*/p \) under price rigidity. This reduces the demand for domestic goods by the Marshall Lerner condition which ensures that foreigners substitute out of now more expensive domestic exports and into foreign goods while domestic agents purchase more of the now cheaper imports from abroad and substitute out of domestically produced goods. The IS curve then must shift back ultimately to its original position since these flows of goods and capital cease only when \( i = i^* \) again.

(Recall the IS curve is given by \( Y = \frac{1}{(s+m)}(A+T-bi^*+aq) \), \( a > 0 \), \( b > 0 \), \( A \) = autonomous spending (including lump sum rebates) and \( T \) autonomous component of trade balance which may include the effects of tariffs and other policies that do not directly impact on \( q \)).

#3.