1. Indicate for each of the statements below whether it is true or false, or elaborate on a statement if it does not require a true/false judgment. Briefly explain, supporting your argument with graphs, formulas, or simple reasoning. OE–SR means Open Economy–Short Run; OE–LR—Open Economy–Long Run; I—Investment; C—Consumption. Each question is worth 2 points.

(a) (OE–LR) For a small open economy, we may expect that a trade surplus is accompanied by domestic net increase in the holdings of foreign assets, i.e., by domestic net investment into the foreign economies, i.e., the capital outflow.

(b) (OE–LR) The law of one price states that the same good should sell at the same price in different countries, i.e., $e_i \frac{P_i}{P_i^*} = 1$, where subscript $i$ stands for some good $i$. You would expect that the absolute purchasing power parity $\frac{e_i}{e_i^*} = 1$, defined for a basket of the goods that form the weighted average price $P$, should rather hold for tradable goods (such as wheat, computers, etc.) than for non-tradable goods (such as haircuts).

(c) (OE–LR) Assume two countries with different but constant income velocities of money. Assume that country I (Industrialized) has money growth equal to 2%, while country D (Developing) has money growth equal to 10%. Assume that the population growth in both economies as well as the growth of the efficiency of labor are zero. Assume that the absolute purchasing power parity for both economies holds. We may conclude that, in the long run, currency of country I will depreciate in nominal terms relative to the currency in country $D$ by 8%.

(d) (OE–SR–Real shock) Use the Mundell-Fleming model to predict the effects of a fall in domestic consumers’ confidence on aggregate income, the exchange rate, and the trade balance in a small open economy with a flexible exchange rate regime.

(e) (OE–SR–Real Shock) Use the Mundell-Fleming model to predict the effects of a fall in domestic consumers’ confidence on aggregate income, the exchange rate, and the trade balance in a small open economy with a fixed exchange rate regime.

(f) (OE–SR–Money demand shock) Use the Mundell-Fleming model to predict the effects of the introduction of ATMs that leads to a fall in the domestic demand for money on aggregate income, the exchange rate, and the trade balance in a small open economy with a fixed exchange rate regime.

(g) (I) Use the neoclassical model of investment developed in class to predict the impact of anti-inflationary policy that raises the real interest rate on the rental price of capital ($R/P = MPK$), the cost of capital ($r + \delta$), and net investment ($I_n = I_n [MPK - (r + \delta)]$).

(h) (C) The Permanent Income Hypothesis (PIH) predicts that if one has a temporary, ‘surprise’, reduction in income, e.g., due to a temporary illness, consumption will be reduced by the magnitude of the income reduction.

(i) (C) The PIH predicts that if one expects that his disposable income will increase in the next period (e.g., when the last mortgage payment is done) the adjustment of consumption between the current ($t$) and next periods ($t+1$) will be sensitive to this predictable increase in the disposable income: i.e., $\Delta C_{t+1}$ will be sensitive to a portion of $\Delta Y_{t+1}$ due to the predicted increase in disposable income.

(j) (RBC) Suppose the economy’s output fluctuates due to real technological shocks, and the economy’s prices are fully flexible. If the central bank aims to stabilize the price level, what would it do to the money supply? As a result of this policy, does output change in the same direction as money supply? Would you make an inference that money causes output (as monetarists claim), or the real shocks cause unidirectional fluctuations in money and output (as RBS theorists would)?
The Mundell-Fleming model is comprised of two equations:

IS* : \[Y = C(Y - T) + G + NX(q) + I(r^*)\]
LM* : \[M/P = L(r^*, Y).\]

Assume that IS* has the following form: \[Y = \frac{C}{Y - T} + \alpha \cdot (Y - T) + \beta \cdot r^* + G + \gamma \cdot q,\] or \[Y = -\frac{\alpha}{1 - \alpha}T + \frac{1}{1 - \alpha}(\frac{C}{Y - T} + \beta \cdot r^* + G + \gamma \cdot q).\] Plug this definition of the IS* into the LM* to obtain:

LM* : \[M/P = L[r^*] - \frac{\alpha}{1 - \alpha}T + \frac{1}{1 - \alpha}(\frac{C}{Y} + \beta \cdot r^* + G + \gamma \cdot q)].\]

We can think of a fall in consumers’ confidence as a reduction in \(C\), a fall in the autonomous component of aggregate consumption, or a reduction in \(\alpha\), an increase in the savings rate. To simplify the matters, assume that \(\bar{C}\) fell. For a given money stock, the price level, the interest rate, and the real exchange rate, the demand for domestic currency will fall, and this will result into depreciation of the nominal and real exchange rates. Since, under the flexible exchange rate, the central bank does not control the nominal exchange rate, it stays at a new, lower, equilibrium level. This, in turn, results into the expansion of \(NX\), and the same output as before. Note, using our original LM* and flexible exchange rates, that output can change only if \(M\) changes exogenously.

In this case, the central bank cannot let the nominal exchange rate to depreciate. It will cut the supply of domestic money to keep the nominal exchange rate at its previous value. Since the market nominal exchange rate was temporarily lower than the one set by the central bank, domestic currency becomes relatively unattractive. The profiteers will purchase “Canadian dollars” in the market and sell it to the central bank, endogenously contracting the supply of domestic currency. E.g., it the central bank sets \(e=Yen\ 100$/1\ and the market nominal exchange rate is \(Yen\ 50/\$1\), one can purchase \$2 in the market for foreign exchange rate for \(Yen\ 100\ and sell it to the central bank for \(Yen\ 200\ — a pure profit of \(Yen\ 100\). Since the central bank endogenously contracts the money supply in response to the shock, output will fall by the magnitude of the fall in \(C\), and \(NX\) will stay the same since \(q\) is held fixed.

The introduction of ATMs will lead to a fall in the money demand, for any given nominal and real exchange rate. This must result into depreciation of domestic currency. If the central bank is committed to keep the nominal exchange rate at its fixed level, it will contract the money supply. The results are the following: \(NX\) will stay the same since \(q\) is held fixed, \(Y\) is the same since none of the real components of aggregate demand changed.

\[\text{Answer:}\]

(a) True. Positive exports imply positive imports of foreign assets, or an increase in the domestic claims on foreign output (an increase in domestic net holdings of foreign assets). Thus, trade surplus is associated with the capital outflow from domestic economy into the foreign economies.

(b) True. It is hardly possible to capitalize on the differential prices of some non-tradeable goods across the borders, haircuts being a good example. Thus, we may reasonably think that deviations from the absolute purchasing power parity should persist longer for the price indices composed of non-tradeable goods.

(c) False. It follows that \(\alpha = (\Delta M/M)^* = 0.02; \pi^D = (\Delta M/M)^D = 0.1\). If we further assume that the relative purchasing power parity holds in the long run, \(\Delta_{\pi^e} = 0 = \Delta_{\pi} + (\pi^f - \pi^D)\), then \(\Delta_{\pi^e} = \pi^D - \pi^f = -0.08\). (We assumed that country I is domestic country, and D is foreign country.) Thus, in the long run, we should expect that the currency of country I should appreciate relative to the currency of country D by 8%.

(d) The Mundell-Fleming model is comprised of two equations:

\[IS^*: Y = C(Y - T) + G + NX(q) + I(r^*)\]

\[LM^*: M/P = L(r^*, Y).\]

(e) In this case, the central bank cannot let the nominal exchange rate to depreciate. It will cut the supply of domestic money to keep the nominal exchange rate at its previous value. Since the market nominal exchange rate was temporarily lower than the one set by the central bank, domestic currency becomes relatively unattractive. The profiteers will purchase “Canadian dollars” in the market and sell it to the central bank, endogenously contracting the supply of domestic currency. E.g., if the central bank sets \(e=Yen\ 100$/1\ and the market nominal exchange rate is \(Yen\ 50/\$1\), one can purchase \$2 in the market for foreign exchange rate for \(Yen\ 100\ and sell it to the central bank for \(Yen\ 200\ — a pure profit of \(Yen\ 100\). Since the central bank endogenously contracts the money supply in response to the shock, output will fall by the magnitude of the fall in \(C\), and \(NX\) will stay the same since \(q\) is held fixed.

(f) The introduction of ATMs will lead to a fall in the money demand, for any given nominal and real exchange rate. This must result into depreciation of domestic currency. If the central bank is committed to keep the nominal exchange rate at its fixed level, it will contract the money supply. The results are the following: \(NX\) will stay the same since \(q\) is held fixed, \(Y\) is the same since none of the real components of aggregate demand changed.
(g) Net investment is a function of the differential $MPK - (r + \delta)$, where $MPK$ is the per unit benefit of investing and $r + \delta$ is the per unit cost. If the differential is positive, it would pay to invest on a margin, up until the point when $MPK = r + \delta$. An anti-inflationary policy will affect immediately $r$ (via decline in $\pi^e$), the cost of investing, but will not affect $MPK$ since the capital at your disposal is hard to adjust quickly. Thus, the per unit profit from investing falls, and the net investment will fall. The cost of capital increases, and the rental price of capital would stay the same.

(h) First, the PIH states that consumption responds to ‘news’: unpredictable changes in the lifetime resources, i.e. permanent income, that occur due to unpredictable events. Second, the PIH states that the magnitude of the change in consumption will be dependent on the effect of this shock in income on your permanent income. Since the shock is reasonably assumed to be temporary, we may expect that it does not affect much the permanent income. Therefore consumption will barely, if at all, respond to this shock. A PIH consumer who is not borrowing constrained will deplete his stock of savings to cope with this temporary shock.

(i) False. Consumption will not respond to this predictable increase in the future disposable income. A PIH consumer who is not borrowing constrained would revise his estimate of the permanent income in period $t$ and set his consumption equal to the annuity value of this estimate. In the next period, consumption will change only if there are additional ‘news’ about permanent income, and $\Delta C_{t+1}$ should not respond to the variation in disposable income $\Delta Y_{t+1}$ which originates from the variation due to the last mortgage payment at $t + 1$.

(j) Equilibrium in the money market demands the equation $M/P = L(r, Y)$ to hold. If output increases and prices are fully flexible, $P$ should fall, to accommodate increases in the money demand—the RHS of the equation. If the central bank smooths the prices in the economy, it will expand the money supply. If all of this is the case, then the beneficial real shocks cause both output and money supply to increase, definitely a story that the RBC theorists would be comfortable with.