1. Use the Mundell-Fleming model to predict what would happen to aggregate income, the exchange rate, and the trade balance in the following situations. Assume a small open economy.

   a. Congress ramps up spending for the war in Afghanistan, with a fixed exchange rate.

   The increase in spending is an increase in G, which shifts the IS curve outward. As a result, there is upward pressure on the exchange rate. Since the central bank is operating with a fixed exchange rate, arbitrageurs will exchange foreign currency for dollars as dollars become more valuable, thus expanding the supply of dollars and pushing the LM curve outward until it reaches a new equilibrium with higher output. NX is unchanged, as R is unchanged and there was no shift in the NX curve.

   b. Same as (a), with a flexible exchange rate.

   Under a flexible exchange rate, there is no shift in the LM curve, as the central bank does not need to maintain a fixed R. As a result, Y is unchanged, R increases, and NX falls (because the exchange rate makes the country’s exports more expensive in foreign countries).
c. **China revalues its currency. What is the effect of this policy on the Chinese economy?**

China has a fixed exchange rate and there is debate about whether China should revalue its currency, allowing the yuan to appreciate – other countries often argue that China is keeping its currency at an artificially low value to make its exports more attractive. If China revalues its currency at a higher exchange rate, we see R increase. Arbitrageurs will sell yuan in exchange for dollars until there is once again equilibrium. China will see a fall in Y, rise in R, and fall in NX (because R is now higher). (As the question suggested, we assume the perspective of a small open economy for the analysis).

d. **What is the effect of the Chinese revaluation on the rest of the world as an aggregate?**

If the Yuan is revalued and appreciates, then the rest of the world will be able to exchange the Yuan it was holding for more of other currencies. Arbitrageurs will thus sell their Yuan at the new revalued price in exchange for world currencies, so the supply of world currencies rises and the LM curve shifts out. R goes down, Y goes up, and NX goes up (as exports to China are now relatively more attractive to Chinese consumers).
2. Consider the situation of Argentina in 1999, an open economy with a fixed exchange rate. The government faced rapidly deteriorating economic conditions. Unemployment was rising, GDP falling, and the government debt accumulating. Given the recent instability of Mexico and Brazil, many investors started to see their investments in Argentina as increasingly risky, and began withdrawing their investments. We will analyze this situation using the Mundell-Fleming model for a small open economy.

   a. Start by drawing the initial IS$ and LM$ curves. Then show how these would shift as a result of the increased riskiness.

The new curves are:

**IS$:** \[ Y = C(Y - T) + I(r^d + \theta) + G + NX(R) \]

**LM$:** \[ \frac{M}{P} = L(r^d + \theta, Y) \]

The \( r^d + \theta \) serves to raise the effective domestic interest rate for Investment in the IS$ curve, shifting the curve in, as there is now less investment. The LM$ shift is a bit more complicated: in the short run, \( M/P \) (real money balances) have not changed, so real money demand must stay the same. Since real money demand is affected negatively by \( r^d + \theta \), the increase in the interest rate (which drives down money demand) must be offset by an increase in \( Y \) (which increases money demand). There is pressure to make the LM$ curve shift out to accommodate this upward pressure on \( Y \).
**This may seem counterintuitive – in real life, countries with risk and panic experience recessions, not booms. The reason we don’t see the increase in Y in real life is threefold: (1) Central bank may fight rapid depreciation by contracting money supply, (2) the depreciation may increase the price of imported goods enough to drive the price level up and cause a decline in M/P, and (3) with uncertainty and risk, consumers may actually horde money as a result of the new r^d + \theta.**

b. **Use the graphs to show how the risk affects the exchange rate, output, and trade balance in Argentina. Briefly explain the logic behind these results.**

Because Argentina is operating a fixed exchange rate, it will be buying Argentinean currency and selling dollars until it starts to run out of dollars, driving the LM$ curve back to maintain R. This causes a fall in Y, but NX is unchanged (as R is unchanged).

c. **In 2001, the risk continued to get worse and the Argentinean central bank was running low on its supply of dollars, so it floated its currency and moved to a flexible exchange rate. Show what happens in this situation, as opposed to the fixed exchange rate regime. How do the exchange rate, output, and the trade balance change?**
This is like part (a). The IS$ continues to shift in, while the LM$ shifts out. R falls dramatically, Y increases, and NX increases as a result of the dramatic fall in R.

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\text{IS} (1) \quad \text{LM} (1) \quad \text{LM} (2) \quad \text{IS} (2)
\]

\[
\text{Y} (1) \quad \text{Y} (2)
\]

\[
\begin{align*}
R & \quad \text{LM} (1) \\
R (1) & \quad \text{LM} (2) \\
R (2) & \quad \text{IS} (1) \\
\end{align*}
\]

\[
\begin{align*}
Y & \quad \text{Y} (2) \\
Y (1) & \quad \text{Y} (2)
\end{align*}
\]

\[d. \quad \text{Say the year is now 2020, and Argentina is on solid economic footing. There is speculation that the Argentinean currency will appreciate over the next several months. Explain in words and with a graph what is the immediate effect on the exchange rate, output, and net exports if Argentina has a floating exchange rate.}\]

If investors have reason to believe that the Argentinean currency will appreciate, there will be increased demand to invest in the currency at its current value, and so the flow of funds into Argentina will increase. The effect can be modeled similarly to the risk premium—but instead of \( r^d + \theta \) we now have \( r^d - \theta \) because investors are now willing to accept a lower interest rate (thinking the currency will appreciate and that they will have a higher effective return once it does). The IS$ curve shifts out and the LM$ curve shifts in, lowering Y, increasing R, and lowering NX. This demonstrate how mere speculation that the value of a currency will change can actually make the value of the currency change—the idea of a self-fulfilling prophecy.

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\begin{align*}
\text{IS} (2) \\
\text{LM} (2) \\
\text{IS} (1) \\
\end{align*}
\]

\[
\begin{align*}
\text{Y} (2) \\
\text{Y} (1) \\
\text{Y} (2)
\end{align*}
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3. **A question on the impossible trinity (IT).**

   a. Define the impossible trinity in your own words in one sentence.

   The impossible trinity is an idea reflecting the fact that a country cannot simultaneously engage in independent monetary policy, maintain a fixed exchange rate, and allow a free flow of capital – a country may only employ two of these policy strategies at any given time.

   b. Give an example of something that is impossible according to the IT. Be specific (i.e., pick a country and an impossible set of policies).

   It would be impossible for the USA to maintain its current policies (free capital flows and independent monetary policy) and also adopt a fixed exchange rate regime, for example pegging the dollar to the Euro. If the USA pegged the dollar to the Euro, then the Fed would have to buy and sell dollars and Euros to maintain the exchange rate, letting the money supply fluctuate to accommodate these monetary pressures by arbitrageurs. If the USA maintained open capital flows, then the Fed would no longer be able to engage in open market operations targeting interest rates, as such changes would cause the dollar to appreciate or depreciate relative to the Euro, and would cause the Fed to break away from the fixed exchange rate regime. Likewise, if the USA maintained the capability to use monetary policy to respond to domestic economic fluctuations, then it would be impossible to maintain free economic flows.

   c. Apply the reasoning of the impossible trinity to Greece.

      i. What choice of policies has Greece made (Hint: Greece is part of the European Monetary System)?

      As a member of the Eurozone, Greece has (a) Free flow of capital and (b) a Fixed exchange rate.

      ii. Given Greece’s fragile financial situation, what policy change would you recommend if adherence to its current policy arrangement becomes too costly? Relate your choice to the IT.

      Greece has been facing a growing debt with an increasing risk of default, and has had trouble attracting investment as a result. Eurozone countries have demanded that ‘austerity measures’ be implemented – higher taxes and lower spending. However, growth is still down dramatically.

      One solution (other than default) is to leave the Eurozone and adopt independent monetary policy to devalue the currency to boost NX and output.
4. Assume that Ricardian equivalence is an accurate assumption about consumer behavior. What would be the immediate effect on (1) private saving, (2) national saving, (3) consumption, and (4) real output for the following two stimulus packages:

a. A surprise extension of the Bush-era tax cuts for ten years.

Ricardian equivalence assumes that consumers realize that any tax cuts will be financed by higher taxes in the future (assuming there is no cut in spending). Consumers will realize that their lifetime income has not changed, and so they will maintain their current level of consumption, and will thus save the tax cut.

(1) Private savings increases by the amount of the tax cut.
(2) National savings is unchanged (since government savings falls by the tax cut).
(3) Consumption is unchanged.
(4) Real output is unchanged.

*For simplicity, we are assuming that the taxes are non-distortionary and that individuals live across the ten years (so that they do not have an incentive to increase consumption as a result of nearing the end of life).

b. A surprise increase in government purchases for a $50 billion high-speed railroad with its hub at Phelps Gate.

Consumers realize that there will be a tax increase in the future to cover the $50 billion, but they do not have an immediate increase in income like they do in situation (a).

(1) Private savings increases by $50 billion.
(2) National savings is unchanged.
(3) Consumption falls by $50 billion.
(4) Real output is unchanged.

*For simplicity, we are assuming that there are no dynamic effects of the spending on growth.