Problem 1

Home country pegs its currency to the USD if Home output is higher than 985, but everyone knows that Home government will allow depreciation of 1% for one year if its output falls to 985 or lower. Home output is 1000 when its interest rate is 2%, but Home output falls by 5 every time the Home interest rate increases by 1 percentage point. Investors are risk neutral and there is no default risk.

(a) Suppose the peg is credible: Home government will allow depreciation of 1% for one year if output falls to 985 or lower, but no one believes it will actually come to that. For US interest rates $i^* \in \{2, 3, 4, 5, 6, 7, 8\}\%$, determine corresponding Home interest rates and output.

Solution. Let us gather insight from the generalized version of UIP,

$$i = i^* + \text{currency premium} + \text{default RP}.$$

The currency premium is zero because expected depreciation is zero and investors are risk neutral, and we're told default risk is zero. Therefore i will simply track i^*.

Suppose the US interest rate is $i^* = 2\%$. To maintain the peg, Home country must set its own interest rate to $i = 2\%$, which generates output of 1000.

Suppose the US increases its interest rate to $i^* = 3\%$. To maintain the peg, Home country must raise its own interest rate to $i = 3\%$, which reduces output to 995.

And so on and so forth. Keep going and you end up with the following table:

Credible Peg

US interest rate i^*	2%	3%	4%	5%	6%	7%	8%
Home interest rate i	2%	3%	4%	5%	6%	7%	8%
Home output	1000	995	990	985	980	975	970

(b) Suppose the peg is non-credible: Home government will allow depreciation of 1% for one year if output falls to 985 or lower, and investors believe it will actually come to that. For US interest rates $i^* \in \{2, 3, 4, 5, 6, 7, 8\}\%$, determine corresponding Home interest rates and output.

Solution. Default risk is still zero and the exchange rate risk premium is still zero. But people expect a 1% depreciation, implying a currency premium of 1%. Home country must offer an interest rate 1% higher than the US to get people to accept the expected depreciation of Home currency. In UIP terms,

$$i = i^* + \underbrace{\text{currency premium}}_{1\%} + \cancel{\text{default RP}}$$

Therefore i will now track $i^* + 1$.

Then $i^* = 2\%$ requires $i = 2 + 1 = 3\%$, which brings Home output down to 995.

And $i^* = 3\%$ requires $i = 3 + 1 = 4\%$, which brings Home output down to 990.

And so on and so forth. Keep going and you end up with the following table:

Non-credible Peg

US interest rate i^*	2%	3%	4%	5%	6%	7%	8%
Home interest rate i	3%	4%	5%	6%	7%	8%	9%
Home output	995	990	985	980	975	970	965

(c) Whether (a) or (b) holds depends on whether investors believe that the peg is credible. Regardless of beliefs, which US interest rates will not lead to speculative attack?

Solution. A speculative attack can only happen if the peg is going to break, which won't happen as long as output is greater than 985.

If speculators believe the peg is credible, then the peg is safe when $i^* \in \{2, 3, 4\}\%$.

If speculators believe the peg is non-credible, then the peg is safe when $i^* \in \{2, 3\}\%$.

Therefore speculators are certain to not attack as long as $i^* \in \{2, 3\}\%$.

(d) Regardless of beliefs, which US interest rates guarantee speculative attack?

Solution. A speculative attack can only happen if the peg is going to break, and the peg only breaks when output hits 985 or lower.

If speculators believe the peg is credible, then it breaks when $i^* \in \{5, 6, 7, 8\}\%$.

If speculators believe the peg is non-credible, then it breaks for $i^* \in \{4, 5, 6, 7, 8\}\%$.

Therefore speculators are certain to attack when $i^* \in \{5, 6, 7, 8\}\%$.

(e) At what US interest rate are there two equilibria? What are the equilibria?

Solution. Speculators are certain to not attack when $i^* < 4\%$, and certain to attack when $i^* > 4\%$. What about $i^* = 4\%$? Depends on whether speculators believe the peg is credible; and therefore two equilibria exist, one equilibrium for each belief.

They believe it's credible? The credible equilibrium is $i = 4\%$ and $Y = 990$ with no speculative attack: the peg is maintained.

They believe it's non-credible? The non-credible equilibrium is $i = 5\%$ and $Y = 985$ with a speculative attack: the peg is broken.

These equilibria are referred to as a *self-confirming*: when the peg is believed credible, that belief is confirmed insofar as the peg actually is maintained; when the peg is believed non-credible, that belief is confirmed insofar as the peg actually breaks.

Problem 2 (Partial Sample Final Question 1)

(a) What is meant by home bias in an investment portfolio?

Solution. Ideally a portfolio will have a sizable proportion of assets from all over the world so that if something bad happens to one country, then only that portion of the portfolio will tank. That is, a properly diversified portfolio diversifies over countries as well as things like industries. *Home bias* means domestic residents like to hold a higher proportion of home assets than optimal diversification would imply, which means when the home country tanks, the portfolio takes a bigger hit than necessary.

(b) What is a currency board?

Solution. A currency board is a fixed exchange rate regime such that the central bank has $B = 0$ so that the entire money supply is backed by foreign reserves: $M = R$. In other words, the backing ratio $R/M = 100\%$. There are a bunch of rules and regulations to maintain the 100% backing ratio as well.

(c) As of now (2022) how many countries are in the eurozone? Which countries are the most recent to have joined?

Solution. The eurozone are the countries in the European Union that have replaced their currencies with the euro. Currently (as of 2022) there are 19 such countries.

Country	Year Joined	Country	Year Joined
Austria	1999	Latvia	2014
Belgium	1999	Lithuania	2015
Cyprus	2008	Luxembourg	1999
Estonia	2011	Malta	2008
Finland	1999	The Netherlands	1999
France	1999	Portugal	1999
Germany	1999	Slovakia	2009
Greece	2001	Slovenia	2007
Ireland	1999	Spain	1999
Italy	1999		

The most recent countries to join are the Baltic states: Lithuania (2015), Latvia (2014), and Estonia (2011).

(d) As of now (2022), which countries are part of the ERM II?

Solution. Denmark, Bulgaria, and Croatia. They do not have the euro as their currency and are therefore not part of the eurozone; but these three countries are part of the ERM II, which requires that their exchange rates only fluctuate within a fairly narrow band around the euro. Croatia plans on joining the eurozone by 2023 and Bulgaria by 2024. Romania plans on joining the ERM II by 2024.

(e) Which EU countries appear unlikely to join the eurozone?

Solution. Denmark negotiated an opt-out, meaning it is allowed to be part of the EU even with no intention of adopting the euro as currency. That said, it still pegs closely to the euro as part of the ERM II. It seems to like it that way.

Sweden seem content maintaining its own currency. Unlike Denmark, the Sweden has rejected the ERM II requirement of joining the EU: the krona is floating and they have no intention of joining the eurozone (thereby violating EU agreements, but no one seems to care for some reason).

The governments of the Czech Republic, Hungary, and Poland all say that joining the eurozone isn't on their agenda. But none of them are compliant with requirements for joining the eurozone anyway, so talk is cheap.

Problem 3 (Sample Final Question 3)

In the years leading up to the Great Depression, a key objective of the federal government was to balance the government budget.

(a) Suppose that tax revenue collected by the government depends on income. During a recession, what happens to government tax revenues? What does this imply about the government budget?

Solution. There is a fall in Y during a recession. There is now less income to tax, therefore government tax revenue falls and the government budget moves closer to a deficit — government spending has not changed but its ability to pay for that spending has decreased.[1]

(b) If the government wants to keep the budget balanced, what type of fiscal policy must the government implement? Illustrate the effects of this policy using the IS-LM-FX diagram, assuming a floating exchange rate regime.

Solution. Since tax revenue has fallen, the government has to respond to reducing its spending so that $\Delta G = \Delta T$. This shifts the IS curve to the left.

(c) State how the fiscal policy affects Y, i, E, C, I, and TB. Is this a stabilization policy?

Solution. We have lower Y, so lower C; lower i, so higher I; and higher E. Depreciation implies more exports; lower Y implies fewer imports; so TB increases.

(d) The US was part of the gold standard, fixing its exchange rate to the value of gold. Illustrate how the policy described in part (b) affects the economy differently under a fixed exchange rate regime. State how the fiscal policy affects Y, i, E, C, I, and TB.

[1] *(This is optional.)* Note that consumption behavior will be different because Y goes down in a recession, but now T goes down as well, so disposable income $Y_d = Y - T$ goes down by *less* than it would were taxes constant, and therefore consumption goes down *less* than it would were taxes constant. In other words, C is less responsive to changes in Y; and therefore the demand function in the Keynesian Cross diagram is *flatter*. So when an increase in i shifts the demand function down through I, it implies a relatively small change in Y from the 45° line, and therefore a *steeper* IS curve than if taxes were constant.

Solution. If there's a fixed exchange rate, then the central bank needs to shift the LM curve to the left to stabilize i and therefore stabilize E (and incidentally I). This reduces Y even further (making it anti-stabilization policy) and therefore consumption as well. The reduction in Y implies fewer imports, so TB increases.

(e) How did the macroeconomic regime affect stabilization policy in this scenario?

Solution. The fixed exchange rate lead to large swings in Y because the central bank was forced to engage in contractionary policy in order to maintain the peg to gold. Perhaps gold standards have been abandoned for a good reason. The obsession with a balanced budget exacerbated the recession as well since it required cuts to G.