

Suggested Solutions to Problem Set 4

Problem 1 : True, False, Uncertain

- (a) **False or Uncertain.** In first generation currency crisis models, bad fundamentals are the sole source of currency crises. In particular, government policies—such as inconsistent fiscal and monetary policies that lead domestic credit to expand—are responsible for the inevitable collapse of the fixed exchange rate regime. On the other hand, in second generation models, self-fulfilling speculative attacks are the main cause of crises. Specifically, there may be a range of fundamentals in which the regime is perfectly sustainable if speculators do not attack the currency, and yet in which the regime will collapse if speculators attack. In this case, both the government and speculators are partly responsible for the fall of the regime.
- (b) **False.** While it is true that under Bretton Woods the U.S. had some degree of monetary autonomy, ultimately the U.S. was constrained by its commitment to keep the dollar pegged to gold. Because the U.S. was the center country in the monetary system, it was able to undertake expansionary policy to keep the U.S. at full employment and force other countries to follow in order to maintain their pegs against the dollar. In the long run, however, this expansionary policy put upward pressure on the gold price and undermined the Bretton Woods system.
- (c) **True.** In general, this statement is true. While there are costs to excessive surpluses, the costs of external deficits are likely to be higher. In particular, deficit countries that are borrowing from the rest of the world often face more acute pressure to reduce imbalances as capital markets become reluctant to continue lending to a deficit country. Moreover, in settings where deficits are financed by central bank selling of reserves, then there is a hard binding constraint on imbalances—namely, when reserves run out, adjustment must follow.
- (d) **False.** In general, under a fixed exchange rate regime, it is necessary for a country to use both fiscal policy and exchange rate adjustments to achieve both internal and external balance. You should be able to illustrate this in the internal-external balance diagram. The underlying idea is that the country has two objectives—internal and external balance—and two instruments—the exchange rate and fiscal policy. If the country uses only one instrument, say fiscal policy, it will be able to achieve only one of the two objectives. To achieve both objectives, the country must use both instruments.

Problem 2: The Gold Standard

- (a) Changes in parities reflected both initial misalignments and balance of payments crises. Attempts to return to the parities of the prewar period after the war

ignored the changes in underlying economic fundamentals that the war caused. This made some exchange rates less than fully credible and encouraged balance of payments crises. Central bank commitments to the gold parities were also less than fully credible after the wartime suspension of the gold standard and as a result of the increasing concern of governments with internal economic conditions.

- (b) A monetary contraction, under the gold standard, will lead to an increase in the gold holdings of the contracting country's central bank if other countries do not pursue a similar policy. All countries cannot succeed in doing this simultaneously since the total stock of gold reserves is fixed in the short run. Under a reserve currency system, however, a monetary contraction causes an incipient rise in the domestic interest rate, which attracts foreign capital. The central bank must accommodate the inflow of foreign capital to preserve the exchange rate parity. There is thus an increase in the central bank's holdings of foreign reserves equal to the fall in its holdings of domestic assets. There is no obstacle to a simultaneous increase in reserves by all central banks because central banks acquire more claims on the reserve currency country while their citizens end up with correspondingly greater liabilities.

Problem 3: Gold and the Great Depression

- (a) The stock market crash could have led to a fall in aggregate demand through a variety of channels. First, the crash decreased the wealth of those who owned stocks and thus could have led them to cut their consumption. Second, a fall in the stock market might have made it more difficult for firms to raise funds for investment, and thus could have led to a fall in investment. Third, and perhaps most importantly according to Christina Romer, the crash generated increased uncertainty that may have led consumers to be less confident about the future and hence to cut back on their consumption. Given these channels, the crash would be expected to lower aggregate demand and hence shift the IS curve leftward. In order to prevent a fall in the interest rate that would have triggered gold outflows from the U.S., the Federal Reserve would be expected to cut the money supply, thereby shifting the LM curve leftward, enough to keep the interest rate unchanged. Obviously, this cut in the money supply magnifies the effect of the fall in demand on output, and so output falls quite significantly as a result.
- (b) Evidence seems to indicate that the Federal Reserve overreacted to the fall in demand. Thus, it contracted the money supply, and shifted the LM curve leftward, so as to actually generate an increase in the real interest rate. Clearly, this would lead to an even larger decline in output. Further, since the U.S. interest rate rose relative to its previous level, this would be expected to cause gold to flow into the U.S. from the rest of the world.
- (c) The increase in U.S. interest rates in part (b) caused gold to flow into the U.S. from the rest of the world. Seeing their gold reserves declining, foreign central banks responded by contracting their money supplies and raising their interest rates in order to stem the gold outflow. Thus, this monetary contraction abroad would shift the foreign LM curve leftward, thereby leading to a fall in output abroad.

This provides a simple explanation of how the Depression spread outward from the U.S. to the rest of the world.

- (d) In part (c), foreign countries were forced to follow the U.S. in contracting their money supplies in order to maintain their fixed gold parities (or fixed exchange rate) against the U.S. Seeing the effect of this policy on their output, some countries chose to abandon the gold standard. In doing so, they regained the ability to use monetary policy to stabilize domestic output. Not surprisingly, countries that left the gold standard early saw smaller declines in their output and price levels during the Depression relative to countries that stayed on the gold standard.

Problem 4: The Policy Trilemma

Policymakers can achieve at most two of the three objectives outlined in the policy trilemma. For example, if the country chooses to fix the exchange rate and allows capital to be freely mobile, then it cannot use monetary policy to stabilize domestic output. With free capital mobility, UIP will hold. Therefore, to keep the exchange rate fixed, the country needs to keep $R = R^*$ and therefore cannot manipulate its interest rate to attempt to stabilize domestic output. The flipside of this example is that if the country wants to use monetary policy to stabilize output and also have free capital mobility, then it must allow the exchange rate to float. Finally, in order to use monetary policy to stabilize output and still maintain a fixed exchange rate, the country would need to restrict capital flows. By restricting capital flows, the country effectively eliminates the UIP constraint because it prevents arbitrageurs from moving capital in and out of the country.

Regarding the classification of historical exchange rate regimes, the gold standard was a regime in which policymakers gave up the ability to use monetary policy to stabilize domestic output. That is, they chose to combine (1) and (2). Under the post-Bretton Woods floating exchange rate system, the major industrial countries have chosen to let their exchange rates float against one another in order to preserve their freedom to use monetary policy to stabilize output. Thus, they have chosen to combine (2) and (3). Describing Bretton Woods is somewhat more difficult. In the early years of Bretton Woods, capital mobility was severely restricted, and therefore countries had some scope to use monetary policy for domestic stabilization. Thus, the early Bretton Woods years (pre-1960) were characterized by a combination of (1) and (3). Over time, capital mobility increased, and as a result governments relinquished monetary autonomy in order to maintain fixed exchange rates. So the late Bretton Woods years (post-1960) could better be characterized as a combination of (1) and (2).

The trilemma is a useful organizing principle to help understand why the gold standard and Bretton Woods were ultimately abandoned. The gold standard was ultimately abandoned because governments decided that they needed to use monetary policy to stabilize output. The rise of socialist parties that cared about unemployment, the Great Depression, and the rise of Keynesian theory all contributed to this new policy consensus. The downfall of Bretton Woods, on the other hand, can be seen as the consequence of the increased restrictions that the regime placed on monetary policy over time. In the early years, the regime was designed to allow countries to have some monetary autonomy, but over time this autonomy was curtailed as capital

flows increased. The reluctance of most countries to live within these constraints led to increased speculative pressure and ultimately the abandonment of the Bretton Woods regime.

Problem 5

The 1961 revaluation crisis in Germany is a good example of the dangers posed by excessive reserve accumulation. A revaluation crisis is just like a devaluation crisis, except in reverse. Instead of the central bank facing a massive selloff of the domestic currency that forces it to sell its reserves, the central bank faces massive purchases of the domestic currency. To maintain the German peg, the Bundesbank must sell domestic currency by purchasing foreign reserves. If this persists, this floods the marketplace with domestic currency that can lead to a surge in inflation.

Interest rates get pushed downward, and since the Bundesbank historically has a strong aversion to inflation, revaluing the currency in 1961 proved to be the only attractive option. When the Deutsche mark gets revalued, then the Bundesbank stops pegging the exchange rate at the higher level. Doing so allows the bank to stop accumulating reserves, stop increasing the money supply, and enables interest rates to rise.

Problem 6: The Gold Points.

- (a) One thing everyone needs to be clear on at this point is that in any fixed exchange rate system, whether a commodity standard like gold or a currency board, monetary policy cannot be used to target domestic economic objectives like full employment, when capital is highly mobile. So under a gold standard, monetary policy is ineffective in increasing domestic output and employment. Why? Because any change in interest rates will lead to gold inflows or outflows that undermine any domestic policy objectives that central banks may have.
- (b) In principle, the existence of gold points would give some breathing room for central banks. If the exchange rate stayed within the gold point boundaries, then a central bank committed to fixing the domestic currency price of gold would be able to adjust interest rates for domestic economic objectives. Why? Because gold inflows or outflows would not occur and would not undermine those policy objectives. By definition of the gold points, it would not be profitable to ship gold in or out of the country.
- (c) To show how gold arbitrage may occur, let's calculate the dollar profit one could obtain by shipping one ounce of gold from Britain to the United States. Recall that S equals the spot rate between the dollar and the pound, that is, 1 pound costs S dollars. In Britain, one ounce of gold costs 4.25 pounds, or $4.25 \cdot S$. To ship this ounce of gold to the U.S. would cost a total of $4.25 \cdot S + T$, where T is the dollar cost of shipping an ounce of gold from the U.K. to the U.S. The profit obtained from selling this ounce of gold to the Fed would then be $21 - (4.25 \cdot S + T)$, because the Fed is obliged to buy and sell gold at 21 \$/oz. Clearly then, this becomes worthwhile only when $21 - (4.25 \cdot S + T) > 0$, or when $S < \frac{21-T}{4.25}$.

So if the spot rate drops below this level, it becomes profitable to ship gold from Britain to the U.S. If this persists, the Fed will experience a significant gold inflow from all those seeking to arbitrage gold, and the Bank of England, Britain's central bank, will suffer a serious gold outflow.

- (d) The Fed, if it plays by the gold standard rules, should lower interest rates so that the dollar would depreciate enough so that S exceeds $\frac{21-T}{4.25}$, and hence, the gold inflow from Britain would stop (by the same reasoning, Britain should raise its interest rates to attract gold into the country and stem its reserve loss as well).
- (e) If V is the pound price of shipping one ounce of gold from the U.S. to Britain, then by the same logic as above, when $S > \frac{21}{4.25-V}$, it is profitable to ship gold from the U.S. This implies the following range of stability for the spot exchange rate:

$$\frac{21-T}{4.25} < S < \frac{21}{4.25-V}$$

Why? Well, if this double inequality holds, it is not worthwhile to ship gold at all between the U.S. and Britain because of the shipping costs, T and V . Let $\underline{S} = \frac{21-T}{4.25}$, and $\bar{S} = \frac{21}{4.25-V}$. So we have $\underline{S} < S < \bar{S}$.

There is a quick way to derive the boundaries for the interest rate, R , in terms of the British interest rate, R^* , \underline{S} , S , and \bar{S} . Since the U.S. and Britain are pegging their currencies to each other, we must have $R = R^*$, which is just the UIP condition for credible, fixed exchange rates. This implies the following:

$R = R^* \Rightarrow (1 + R) = (1 + R^*)$. Combining this with $\underline{S} < S < \bar{S}$, one obtains $(1 + R^*)\underline{S} < (1 + R)S < (1 + R^*)\bar{S}$, because multiplying an inequality by equal, positive numbers preserves the inequality. Dividing through by S and then subtracting 1 from each part of the inequality gives

$$(1 + R^*)\frac{\underline{S}}{S} - 1 < R < (1 + R^*)\frac{\bar{S}}{S} - 1$$

If the U.S. interest rate, R , stays within these bounds, given the spot rate S , there is no incentive to ship gold between the U.S. and U.K.

- (f) Using some actual data on the dollar-pound gold points, the historical dollar-pound parity of \$4.86, and assuming that $R^* = 5$ (a reasonable level), we get that $4.3\% < R < 5.6\%$. So it doesn't appear that the Fed would have a whole lot of room for monetary policy autonomy, despite the presence of shipping costs. Only very modest changes in interest rates would be accommodated by the existence of gold points without triggering gold inflows or outflows.