

## Problem Sets 5

1. A simplified version of the Federal Reserve System's balance sheet on December 31, 1929, is shown below. Most of the Federal System transactions involve member commercial banks and directly affect member bank reserve. Many Federal Reserve transactions are initiated by commercial banks.

<b>Federal Reserve System Balance Sheet December 31, 1929 (billions of dollars)</b>	
<b>Assets</b>	<b>Liabilities and Capital</b>
Gold and cash reserves \$3.01	Federal Reserve notes \$1.91
Federal Reserve credit \$1.58	Deposits \$2.41
• Bills discounted \$0.63	• Member bank \$2.36
• Bills bought \$0.39	• Other \$0.05
• Government securities \$0.51	Other liabilities \$0.69
• Other \$0.05	Capital accounts \$0.45
Other assets \$0.87	Total liabilities and capital \$5.46
Total assets \$5.46	

- 1) If the Fed makes an open market purchase of \$0.01 billions of government securities from a member bank, it pays for the securities by crediting the member bank's deposit with the Federal Reserve. How would this transaction affect the balance sheet of the Fed?
- 2) When the U.S. was on the gold standard, the Fed held substantial gold reserves, and transactions in gold were common. Suppose gold coin of \$0.01 billion was deposited by a customer of a member bank. The bank could send the coin to its Federal Reserve Bank and receive an increase in its reserve deposit of that amount. How would this gold inflow affect the Fed's balance sheet?
- 3) Suppose instead that, triggered by large gold outflow, a member bank was experiencing large cash withdrawals of \$0.1 billion and needed extra currency. The member bank requested currency in the form of Federal Reserve notes. How would this gold outflow affect the Fed's balance sheet?
- 4) The Fed could offset, or "sterilize," the impact of one transaction on bank reserves with a second transaction having the opposite impact on reserves. If there was a gold outflow of \$0.1 billion, what would the Fed do to sterilize money supply? What would happen to the Fed's balance sheet?
- 5) Similarly, a bank could borrow reserves from its Reserve Bank to pay for Federal Reserve notes needed to satisfy withdrawal demands of \$0.1 billion, and thus avoid drawing down its reserve deposit. In this case, what would the Federal Reserve do to offset money supply? What would happen to its balance sheet?

Reference: David Wheelock (1992) Monetary Policy in the Great Depression: What the Fed Did and Why? Federal Reserve Bank of St. Louis Review.

2. Consider a country that has a local currency known as the dollar and its money supply is \$1,500 million, and its domestic credit is equal to \$1,000 million in the year 2019. The country maintains a fixed exchange rate system, the central bank monetizes any government budget deficit, and prices are sticky.

- 1) Compute total reserves for the year 2019 in dollars. Illustrate this situation on a central bank balance sheet diagram (EX-MS-RA model).
- 2) Now, suppose the government unexpectedly runs a \$200 million deficit in the year 2020 and the money supply is unchanged. Illustrate this change in a graph. What is the new level of reserves?
- 3) If the deficit is unexpected, will the central bank be able to defend the fixed exchange rate?
- 4) Suppose the government runs a deficit of \$200 million each year from this point forward. What will eventually happen to the central bank's reserves?
- 5) In what year will the central bank be forced to abandon its exchange rate peg and why?
- 6) What if the future deficits are anticipated? How does your answer to part (5) change? Explain.

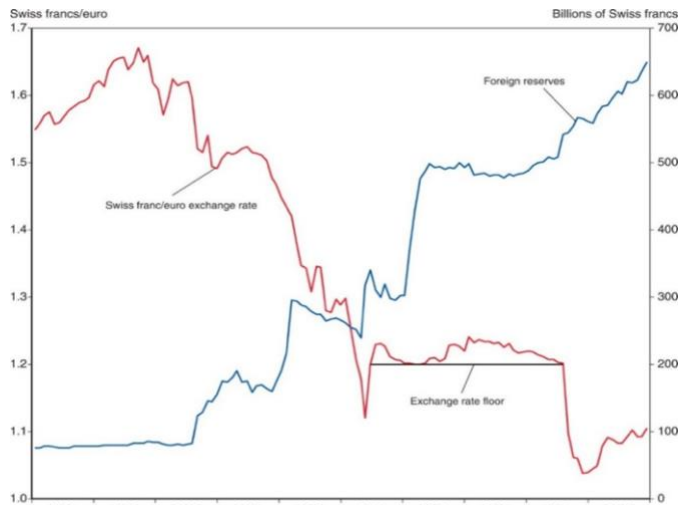
3. U.S. foreign exchange intervention is sometimes done by an Exchange Stabilization Fund, or ESF (a branch of the Treasury Department), which manages a portfolio of U.S. government and foreign currency bonds. An ESF intervention to support the yen, for example, would take the form of a portfolio shift out of dollar and into yen assets. Would ESF interventions alter money supplies in the U.S. economy? How do ESF operations affect the foreign exchange risk premium? Explain. For an introduction of the Fund, refer to <https://home.treasury.gov/policy-issues/international/exchange-stabilization-fund>

4. According to the information on the Federal Reserve Bank of New York: Under a fixed exchange rate system, devaluation and revaluation are official changes in the value of a country's currency relative to other currencies. Under a floating exchange rate system, market forces generate changes in the value of the currency, known as currency depreciation or appreciation. In a fixed exchange rate system, both devaluation and revaluation can be conducted by policymakers, usually motivated by market pressures. The charter of the International Monetary Fund (IMF) directs policymakers to avoid "manipulating exchange rates...to gain an unfair competitive advantage over other members."

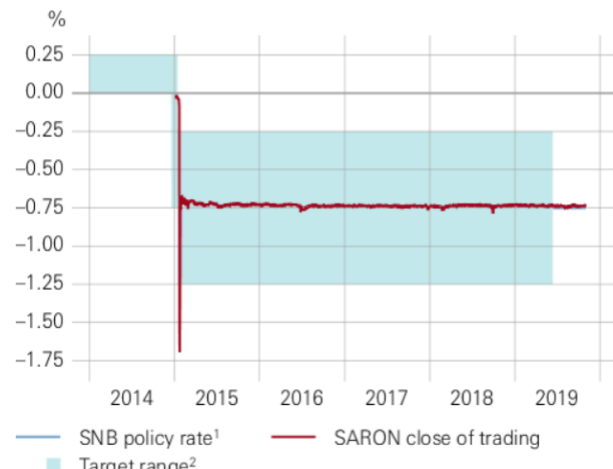
<https://www.newyorkfed.org/aboutthefed/fedpoint/fed38.html>

- 1) A key effect of devaluation is that it helps to reduce the current account deficit. Explain how a devaluation policy can improve current account in a DD-AA-XX model.
- 2) Current account balance equals national saving less domestic investment. The CA improvement can occur only if investment falls, saving rises, or both. How might devaluation affect national saving and domestic investment in Keynesian national income determination theory?
- 3) When a central bank devalues after a balance of payments crisis, it usually gains foreign reserves. What would happen to its balance of payment if the market believed that another devaluation would occur in the near future? Analyze the money-forex market equilibrium.

5. Since the 2008 Global Financial Crisis, the Swiss franc has been under “attack” by global investors who seek for safe-haven assets. The CHF exchange rate is shown below together with the foreign reserves held by the Swiss National Bank (SNB). In order to slow down the appreciation, SNB policy innovations included quantitative easing, swap transactions, and most radically, the establishment of a floor on the euro/Swiss franc exchange rate on 6 September 2011. Swiss interest rates then fluctuated around zero until the dramatic events of mid-January 2015, when the SNB removed the exchange rate floor, lowered interest rates to substantially negative levels, and allowed the franc to appreciate.



Source: Krugman et al (2018) International Finance



Source: Swiss National Bank Statistics

- 1) Why is there a strong negative correlation between Swiss franc's exchange rate and SNB foreign reserves? Apply the demand and supply model to explain.
- 2) What is an exchange rate floor policy? Was it effective? Why could the policy trigger a rebound in Swiss franc exchange rate around September of 2011?
- 3) How could the SNB achieve the exchange rate floor via its monetary policy? What does this policy imply about Swiss monetary policy, interest rate, and foreign reserves?
- 4) Why has the interest rate been negative? Apply the money demand and supply model.
- 5) Apply the money-supply-reserve-adjustment model to analyze the domestic money and credit conditions in Switzerland for the period examined.
- 6) Based on the SNB policy interest rate graph, was FX sterilization pursued by the SNB when it engaged in exchange rate floor policy? Explain.
- 7) How would the SNB exchange rate and interest rate policies affect Swiss internal and external balances? Explain with the DD-AA-XX model.
- 8) What and how can the macroeconomic and financial data be used to verify the prediction in (7)?