

ECON 425

Topics in Monetary Economics:
The International Monetary System
from the Gold Standard to Globalization

Midterm Exam

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Wait for my signal before starting to read the exam.

This is a closed-books, closed-notes exam.

You have 110 minutes to work on it.

You should answer five questions for a total of 100 points.

Read the entire exam and think about the questions before starting to work.

Do not panic if you do not make it to complete all five answers.

Any form of cheating will result in a zero score for the exam.

Question 1: 16 Points

Explain the countercyclicality of international capital flows in the pre-war Gold Standard and the procyclicality after World War I. Explain how countercyclical capital flows contributed to the stability of the system before 1913, and how procyclical flows instead contributed to instability in the 1920s.

Question 2: 20 Points

Suppose the Home country is committed to a Gold Standard arrangement. Its central bank holds reserves in gold and interest-bearing assets. Let RES_t denote the central bank's reserves at the beginning of period t . Then, Home's balance of payments equation is:

$$RES_{t+1} - RES_t = -(B_{t+1} - B_t) + r_t RES_t + r_t B_t + TB_t,$$

where B_t denotes Home's net foreign assets (other than central bank reserves) at the beginning of period t , r_t is the interest rate in period t , and TB_t is the trade balance (the difference between exports and imports) in period t .

Assume the Home country is running a trade deficit and experiencing a capital outflow, and the exchange rate of its currency shows a tendency to depreciate.

- What does this mean for the signs of TB_t and $B_{t+1} - B_t$? And what does this imply for the change in central bank reserves $RES_{t+1} - RES_t$? (Assume $r_t RES_t + r_t B_t$ is small enough that its sign does not change the conclusion that you draw from the signs of TB_t and $B_{t+1} - B_t$.)
- What should the central bank of the Home country do in this situation to maintain its Gold Standard commitment? How (i.e., through what channels) would the central bank's policy affect the trade balance, capital flows, and therefore the change in reserves?

Assume the interest rate is constant: $r_t = r$ in all periods. Iteration of the balance of payments equation over an infinitely long horizon implies:

$$\lim_{T \rightarrow \infty} \frac{B_{t+T}}{(1+r)^{T-1}} + \lim_{T \rightarrow \infty} \frac{RES_{t+T}}{(1+r)^{T-1}} = (1+r)(RES_t + B_t) + \sum_{s=t}^{\infty} \frac{TB_s}{(1+r)^{s-t}}.$$

The assumption that reserves are always finite implies

$$\lim_{T \rightarrow \infty} \frac{RES_{t+T}}{(1+r)^{T-1}} = 0.$$

Thus, we have:

$$\lim_{T \rightarrow \infty} \frac{B_{t+T}}{(1+r)^{T-1}} = (1+r)(RES_t + B_t) + \sum_{s=t}^{\infty} \frac{TB_s}{(1+r)^{s-t}}.$$

- Suppose Home is running a net foreign debt in its non-reserve position at the beginning of period t ($B_t < 0$), and it is running a trade deficit in the current period and for some periods into the future. Explain why these deficits must eventually be balanced by surpluses in the future in order for the country's net foreign debt position not to explode (i.e., for the country's net foreign debt to be sustainable).
- In terms of the last equation above, what does it mean to say that the country's net foreign debt position is sustainable?

Question 3: 16 Points

Based on Ben Bernanke's *Journal of Money, Credit, and Banking* article, explain the role of monetary factors and exchange rate policy in the Great Depression. In explaining the role of monetary factors, refer to the following identity that relates the money stock ($M1$) of a country on the Gold Standard to its reserves of monetary gold:

$$M1 = \left(\frac{M1}{BASE} \right) \cdot \left(\frac{BASE}{RES} \right) \cdot \left(\frac{RES}{GOLD} \right) \cdot PGOLD \cdot QGOLD,$$

where:

- $M1 = M1$ money supply (money and notes in circulation plus commercial bank deposits),
- $BASE$ = monetary base (money and notes in circulation plus reserves of commercial banks),
- RES = international reserves of the central bank (foreign assets plus gold reserves), valued in domestic currency,
- $GOLD$ = gold reserves of the central bank, valued in domestic currency = $PGOLD \cdot QGOLD$,

- $PGOLD$ = the official domestic-currency price of gold, and
- $QGOLD$ = the physical quantity of gold reserves.

Question 4: 24 Points

Suppose that the exchange rate is determined by the following equation:

$$\varepsilon(t) = m(t) + v(t) + \gamma E[d\varepsilon(t)/dt],$$

where all variables are in logs, $\varepsilon(t)$ is the current exchange rate, $m(t)$ is money supply, $v(t)$ is exogenous money velocity, $E[d\varepsilon(t)/dt]$ is the expected change in the exchange rate between now and the next instant, and γ is a parameter such that $\gamma > 0$. Assume that money velocity $v(t)$ follows a random walk process, such that its expected movements are zero, and upward and downward changes are equally probable (in other words, the current level of velocity is the best predictor of its level in the next instant). Suppose that money supply is such that $m(t) = 0$ whenever the exchange rate is inside a symmetric, perfectly credible target zone with upper bound $\bar{\varepsilon}$ and lower bound $\underline{\varepsilon}$ such that $\underline{\varepsilon} = -\bar{\varepsilon}$. The central bank changes its money supply every time random changes in money velocity cause the exchange rate to reach the upper or lower bound of the target zone to prevent it from straying outside.

- Use these assumptions to plot the exchange rate as a function of $v(t)$ as we did in class.
- Make sure you explain how the presence of the target zone has a stabilizing effect on exchange rate dynamics inside the target zone, i.e., explain why the path of the exchange rate inside the target zone does not coincide with the 45-degree line $\varepsilon(t) = v(t)$.
- Why do we say that we can view the functioning of the pre-World War I Gold Standard as the operation of a credible target zone?
- Explain how reduced credibility leads to capital flows that destabilize the exchange rate and can ultimately result in the collapse of the system.

Question 5: 24 Points

Eichengreen's (1984, *Explorations in Economic History*) model of monetary policy interactions during the interwar Gold Standard consists of the following equations (where stars denote the

foreign economy):

Money supply

$$\begin{aligned}M &= \mu(R)(C + G), \\M^* &= \mu^*(R^*)(C^* + G^*),\end{aligned}$$

where M is money, μ is the money multiplier, R is the discount rate, the function $\mu(R)$ is such that $\mu_R < 0$, C is credit, G is the central bank's gold, and foreign variables and money multiplier are defined similarly.

World gold constraint:

$$\bar{G} = G + G^*,$$

where \bar{G} is the exogenously given world stock of gold.

Money demand:

$$\begin{aligned}M/P &= \phi Y, \\M^*/P^* &= \phi Y^*,\end{aligned}$$

where P is the price level and $\phi > 0$ is a constant.

Aggregate supply:

$$\begin{aligned}Y &= Y(P), \\Y^* &= Y^*(P^*),\end{aligned}$$

where the output supply function is such that $0 \leq Y_P \leq \infty$ and similarly abroad.

Purchasing power parity and the exchange rate:

$$\begin{aligned}P &= \varepsilon P^*, \\ \varepsilon &= 1,\end{aligned}$$

where ε is the exchange rate (units of home currency per unit of foreign).

As we saw in class, the model implies the following results on the effects of discount rate changes:

$$\begin{aligned} \frac{dG}{dR} &> 0, & \frac{dP}{dR} &< 0, \\ \frac{dG}{dR^*} &< 0, & \frac{dP}{dR^*} &< 0. \end{aligned}$$

- Given the model structure above, what are the intuitions for these results?

Next, let's think about the objectives of policymakers: The figure in the last page of this exam represents the preferences of the home central bank over gold reserves and price level.

- Explain how we obtain the figure from a policy objective function of the form:

$$W = - \left[(G - G^T)^2 + \alpha (P - P^T)^2 \right],$$

where G^T and P^T are the target levels for gold and price level, and $\alpha > 0$ denotes the relative importance of gold versus price level in the central bank's objectives (the central bank cares about gold more than the price level if $0 < \alpha < 1$).

- What does each curve in the figure represent? What does the center of the map represent?
- The figure also presents the constraint facing the central bank implied by the structure of the economy: Points that are feasible for the central bank to reach are those in the region that has frontier given by the line AA . Explain why this line is downward sloping.
- Why do we say that the central bank faces a tradeoff between its objectives in this model?
- Explain the central bank's choice of where to position itself in the map in the figure through its choice of discount rate R .
- Explain the consequences of an increase in the foreign discount rate.
- How will the home central bank respond if it cares about its gold target more than about the price-level target?

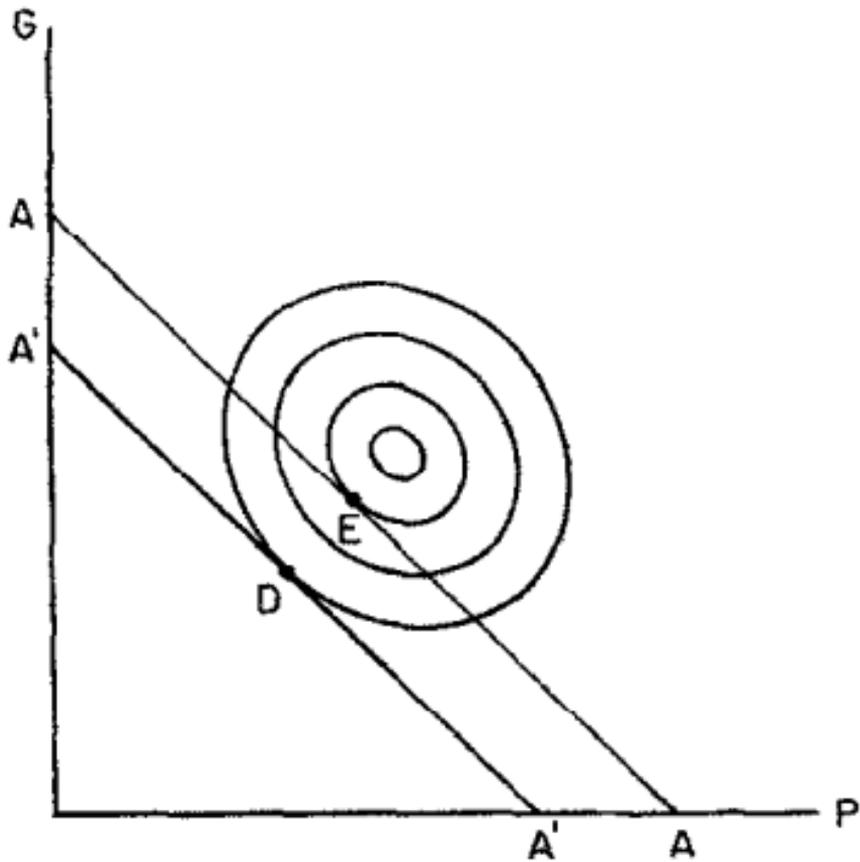


FIGURE 1