

**ECON 4100: Monetary Economics**  
**Homework 1**  
**Lastrapes**  
**Fall 2008**

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1. What is the main cost of a barter exchange system, and how does ‘indirect barter’ help reduce this cost? How does ‘money’ evolve from indirect barter?
2. For each of the following items, state if it serves as money in the modern economy, and briefly explain why or why not: checking deposits at banks, time deposits at banks, a credit card, a debit card, Federal Reserve notes, Bank of England notes, [American Gold Eagles](#).
3. How does ‘credit’ money differ from ‘base’ money? Under a gold standard, how can credit money increase a nation’s money supply, without a change in the quantity of gold? Who ultimately determines the stock of nominal money under a fiat money system?
4. Using the St. Louis Fed’s data set (<http://research.stlouisfed.org/fred2/>), compute the value of the real money supply in the US in January 2007 and January 2008, where nominal money is measured as M2 and the price level is measured as the consumer price index for all urban consumers (use the seasonally adjusted data for each, denoted *SA*). What was the growth rate of the real money supply over this period? What was the CPI inflation rate over this period? Conceptually, what is the difference between nominal money and real money?
5. Use the model of the gold standard developed in class to predict the effects of the following events on an economy’s price level (*P*), nominal money supply (*M*) and monetary gold stock (*G*) in the short-run and the long-run.
  - a. An increase in the economy’s production of goods and services.
  - b. A decrease in the monetary authority’s gold reserve ratio.
  - c. A gold discovery (like the 1849 gold rush in the US).
  - d. An increase in the country’s international trade deficit.
  - e. An increase in the *nominal* price of gold by the government.
6. During World War I, the US remained on the gold standard, unlike Europe. US exports rose during the war, as the US produced much of the supplies its allies needed to fight the war. Now look at this [chart of historical gold prices in the US](#). Was the behavior of the US price level (as measured by the wholesale price index) during this period consistent with the predictions of the gold standard model in the face of rising exports? Why or why not?
7. Imagine an economy on a bimetallic standard in which the government mint freely coins gold and silver (but does not exchange one for the other). In particular, the mint will convert 0.75 ounces of silver into a \$1 silver coin and 0.5

- ounces of gold into a \$10 gold coin. Suppose that the market price of an ounce of gold rises to 16 ounces of silver.
- a. What would tend to happen to the money supply in circulation in this economy, and why? Does your answer depend on whether exchange at “non-par” values is costly?
  - b. What could the monetary authority do to maintain the circulation of gold and silver at par in this case?
8. What do you think are the primary drawbacks of a monetary system based on an ‘oil’ standard,’ under which the central bank would fix the nominal, or dollar, price of oil by agreeing to convert dollars into barrels of oil on demand (and vice versa)?
  9. Radford (1945) details the use of ‘cigarette currency’ in German POW camps during World War II.
    - a. According to Radford, what were the characteristics of cigarettes that led to their use as a medium of exchange and unit of account?
    - b. Using our model of a commodity standard, explain why an increase in the demand for cigarettes for *smoking* would cause ‘deflation’ in the POW camp (see Radford, pp. 194-195).
    - c. Since cigarettes were the medium of exchange and the unit of account in the POW camps, what is the value of  $P_g$  in the cigarette economy?
  10. With respect to the overall stock of money, what are the two potential drawbacks of a fractional reserve banking system? How can the ‘lender of last resort’ function of a central bank help solve one of these problems.
  11. Redemption of bank notes was often costly in a system of many private banks, as in the antebellum US. What is a clearinghouse organization, and how can the clearinghouse make inter-bank note redemption less costly? With a clearinghouse, what would tend to happen to the amount of high-powered money (say gold) relative to banknotes, and why?
  12. Dowd (“The Establishment of Central Banking,” p. 42) claims that “a recurrent theme in English history is the government’s perpetual shortage of money.” When was the Bank of England chartered, and how did it help the English government finance its expenditures?
  13. The following dates were milestones in the evolution of monetary standards in the US: 1792, 1834, 1862, 1873, 1879, 1934, and 1971. For each date, identify the relevant event and provide a brief explanation.
  14. Define the problem of ‘moral hazard’ in the context of the markets for borrowing and lending. How can this problem lead to a collapse of financial markets? How do banks attempt to solve this problem?

15. Answer the following two questions on the computation of interest rates. a) The yield-to-maturity on a 3-year coupon bond is 5%. The bond has a face value of \$10,000 and an annual coupon rate of 6%, with coupon payments made at the end of each year. What is the current price of this bond? b) You purchased shares of stock last year at a price of \$1,000, and sold the stock a year later for \$1,025. If the rate of return during this period from holding the stock was 4%, what was the value of the dividend you received during the period?

## Answers

1. Barter transactions are costly because of the ‘coincidence of wants’ problem: it takes time and resources to find someone who wants your good and who has what you want. Indirect barter occurs when a trader accepts a good in trade not for ultimate consumption, but to use in exchange for another good. The trader presumably anticipates that the good will be acceptable by others, thereby reducing the transactions costs of barter. Money evolves once everyone tends to use the same good in indirect barter; this must be a good that appears to be very sellable – many people are accepting it as indirect barter. This good gradually becomes generally acceptable as a means of payment.
2. Checking deposits at banks are money because they are easily transferable by check (or debit card) and are therefore generally acceptable as a means of payment. Keep in mind that the quantity is the \$ value of the checking deposit. Likewise, while a debit card itself is not money, it is backed up by funds in a bank that serve as money. Federal Reserve notes and Bank of England notes are legal tender liabilities of the US and UK central banks, respectively, and are generally accepted, so they are money. Time deposits at banks are not really money; they are deposits with a fixed maturity that are not generally accepted in exchange – you can’t write a check on them and have to convert them to money before spending. However, time deposits are liquid asset, so they are included in the M2 measure of money (at least small time deposits are). A credit card is a convenient way to borrow. Gold Eagles are pretty to look at, but are not generally acceptable at par.
3. Base money, or high-powered money, is the fundamental, non-convertible medium of exchange in an economy. Credit money is convertible into base money, and is created by banks through lending. Under a gold standard in which paper money is partially backed by gold (a fractional gold standard), the monetary authority can create additional money (notes) simply by making loans, thereby increasing the stock of money relative to its gold reserves. (In terms of the model, this would be reflected as a reduction in the parameter  $k$ .) Under a commodity standard, the stock of money is at least partly determined by the demand for money as reflected in the market for gold; under a fiat money system, the central bank determines the stock of money. There is no link to a commodity.
4. Real and nominal money:

	M2	CPI	M2/CPI	Rate	Inflation
1/07	7,082.2 b	202.416	3,498.834 b		
1/08	7,480.2 b	211.080	3,533.775 b	1.28%	4.28%

To get real money balances, deflate nominal money by the price level. (Since the base year value is 100, the denominator should be  $CPI/100$ .) Real M2 is the value of the US money stock in 1982-84 prices; it is how much money the economy would hold if average prices hadn’t changed since this period. Nominal M2 shows the value of the money stock in current prices. When people determine how much money they want to hold, real money is relevant.

5. Assume that the economy starts from an initial steady-state, in which the stock of gold is fixed. Use the stock and flow graphs to determine the effects on  $P$  and  $G$ . To predict the effects on  $M$ , use the equation:  $k \cdot M = P \cdot G$ .
  - a. An increase in production increases household income, increasing the demand for real money balances. The price level,  $P$ , will fall in the short-run, driving up the real price (or purchasing power) of gold, and inducing flows of gold into the economy. Thus,  $G$  will rise over time, and it will continue until  $P$  rises back to its original level. The nominal money stock,  $M$ , rises with  $G$ .
  - b. A one-time decrease in  $k$ , which is the same as increase in  $M$ , reduces the stock demand for money. This causes  $P$  to rise in the short run. The lower real price of gold causes gold to flow out of the economy, so the gold stock falls and  $P$  returns to its original value.  $M$  initially rises, but returns to its original level in the long-run, because both  $P$  and real money demand don't change. (Think of the stock of gold falling proportionately to  $k$ .)
  - c. A gold discovery reduces the cost of producing gold, shifts the flow supply of gold to the right, which causes gold to flow into the mint. The rising gold stock increases  $P$  and reduces the real price of gold over time. This process will stop when the net flow of gold into the mint stops. In the long run,  $P$  will be higher,  $G$  will be higher, and  $M$  will be higher. ( $M$  and  $P$  will change proportionately.)
  - d. An increase in the trade deficit shifts the flow demand for gold to the right. Gold flows out of the mint, the price level falls and  $M$  falls with  $G$ .
  - e. In this model, when  $P \cdot G$  rises, the price level  $P$  rises immediately. The real price of gold will not change and neither will the gold stock  $G$ . The stock of nominal money  $M$  will rise at the same rates as  $P \cdot G$  and  $P$  (so real money balances won't change).
6. During the WWI period, the price level in the US rose, so the purchasing power of gold fell. This pattern is broadly consistent with our model of the gold standard: as US exports rose, the flow supply of gold into the US rose, driving the real price of gold down through higher domestic prices. (This was also a period when the reserve ratio  $k$  was falling. The sharp fall in prices – and a powerful recession in 1920-21 – was caused by a tightening of money by the Fed in 1920.)
7. The hypothetical mint prices are  $P_s = \$1.33$  and  $P_g = \$20$ . The mint ratio is thus  $20/1.33 = 15$ .
  - a. If non-par exchange is not costly, then we would tend to see both types of coin circulating, where gold would be accepted at a premium relative to silver (i.e. prices of goods denominated in gold would be cheaper than those in silver). If non-par exchange is costly, then silver (the bad money, or money over-valued at the mint) would tend to circulate as money, but not gold.
  - b. The monetary authority could re-value gold and silver mint prices to equal the market ratio. For example, it could raise  $P_g$  to  $\$21.33$ .
8. I can think of at least two problems: 1) the price level would likely be very volatile because of the inherent volatility in the real price of oil; 2) the opportunity cost of holding oil in reserve, and not consuming it, would likely be high. (In this case, the monetary authority would like encourage economizing on oil). The fact that oil is hard to carry around shouldn't be considered a cost; paper backed by oil would comprise money. On the other hand, convertibility might be difficult.

9. Cigarette money
  - a. “Homogenous, reasonably durable, and of convenient size [for small and large transactions.]”
  - b. Smoking is consumption, so this would cause the flow demand for cigarettes to rise. At the initial relative price of cigarettes, the stock of cigarettes will gradually decline pushing up the relative price of cigarettes and thus pushing down the price level.
  - c.  $P_g = 1$ .
10. Banks have an incentive to issue as many notes as possible, and to back these up by profit-generating loans. If they over-issue notes and loans so that their reserve ratios get very small, then there can be excess money and inflation. On the other hand, fractional reserve banking can be fragile: if there is a loss in confidence and trust, depositors can withdraw funds from banks – a scramble for liquidity – which can lead to a reduction in money and decrease in economic activity. The lender of last resort function of the central bank is to provide liquidity in the face of such banking panics to restore confidence and to maintain credit markets.
11. A clearinghouse organization is a group of banks that provides a central means for note/deposit redemption. Banks can hold reserves of high-powered money at the clearinghouse, and redemptions can be made by the clearinghouse on a net-clearing basis – only net reserve positions are cleared. This can allow banks to hold fewer reserves relative to deposits and notes, so the money supply could increase relative to high-powered money (gold).
12. The Bank of England was chartered as a private bank in 1694. It was granted special privileges (e.g. monopoly note issue and prevention from competition) in return for making loans to the government.
13. 1792: Coinage Act that defined the US monetary system as one of gold/silver bimetallism. 1834: Coinage Act redefines the weight of the dollar in gold; because this new mint price defines a mint ratio greater than the market ratio, gold tends to drive silver out of circulation. 1862: Legal Tender Act authorizes the issue of legal tender US notes unbacked by gold or silver – Greenbacks. They were in effect fiat money. 1873: Coinage Act eliminated the free coinage of silver, the ‘Crime of 1873.’ 1879: Resumption of the convertibility of notes into gold. 1934: Roosevelt increases the official price of gold and outlaws private holdings of gold. 1971: Nixon permanently suspends convertibility of dollars into gold at official prices.
14. Moral hazard refers to the costs associated with monitoring and verifying borrower behavior. In financial markets, after a loan is made, it is costly for lenders to monitor this behavior, and there are often incentives for borrowers to behave badly. Because of this risk, lenders might not be willing to lend. Banks can help reduce moral hazard problems by requiring borrowers to put up collateral, or have some net worth in a project to be financed.
15. a) \$10,027. b) \$15

